Xcel Energy®
RESPONSIBLE BY NATURE™

414 Nicollet Mall
Minneapolis, Minnesota 55401-1993

December 3, 2009

Dr. Burl W. Haar
Executive Secretary
Minnesota Public Utilities Commission
121 7th Place East, Suite 350
St. Paul, MN 55101-2147

RE: Application to Public Utilities Commission for a Route Permit
Pleasant Valley to Byron 161 kV line

PUC Docket No. E002/TL-09-1315

Dear Dr. Haar:

Northern States Power Company ("Xcel Energy"), a Minnesota Corporation and wholly-owned subsidiary of Xcel Energy Inc. is electronically filing its request for a route permit for a high voltage transmission line. Xcel Energy has also filed an application for a (Certificate of Need) with the Commission and believes that it would be efficient to combine the contested case and public hearings in the Certificate of Need and Route Permit proceedings and requests that they be held jointly. *See* Minn. Stat. Section 216B.243, subd. 4; Minn. Rule 7849.5330, Subp. 3.

The proposed project consists of a new, approximately 18-mile long, 161 kV transmission line between the Pleasant Valley Substation and the Byron Substation located in Olmsted, Dodge and Mower counties. A Certificate of Need Application was recently filed under Docket No. E002/CN-08-992.

This filing consists of two files. The first file is the body of the application. The second file is Appendices A through F. The application fee payment is being sent to the Department of Commerce under separate cover. Please call me at (612) 330-6538 if you have any questions regarding this filing.

Sincerely,

Thomas G. Hillstrom
Routing Team Leader

Enclosures

Cc: Department of Commerce
State Agency Contacts
PUC Service List

APPLICATION TO THE MINNESOTA PUBLIC UTILITIES COMMISSION FOR A ROUTE PERMIT FOR THE PLEASANT VALLEY TO BYRON 161 KV TRANSMISSION LINE

MPUC Docket No. E002/TL-09-1315

December 3, 2009

Submitted by
Northern States Power Company

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1.0 Executive Summary

1.1 Proposal Summary

Northern States Power Company, a Minnesota corporation ("Xcel Energy") submits this application ("Application") for a Route Permit to the Minnesota Public Utilities Commission ("MPUC" or "Commission") pursuant to Minnesota Statute Chapter 216E and Minnesota Rules Chapter 7850. The Application is for a Route Permit to construct a new 161 kilovolt ("kV") transmission line from the Pleasant Valley Substation in Mower County to the Byron Substation in Olmstead County ("Pleasant Valley – Byron 161 kV Line") and associated modifications at the Pleasant Valley Substation and the Byron Substation ("Project").

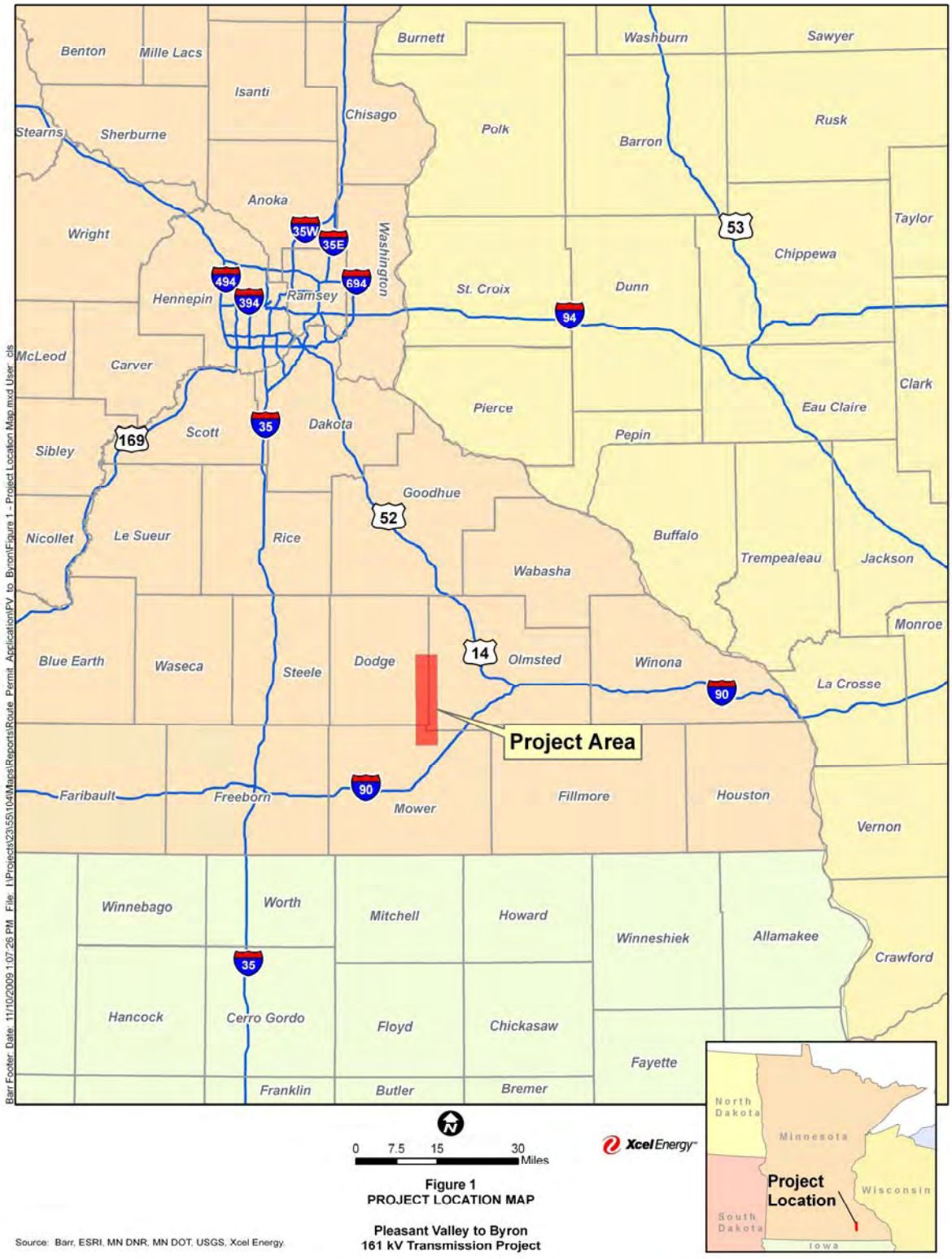
The general project area is shown in Figure 1 ("Project Area").

1.2 Need

The Project is needed to accommodate two existing 100 MW wind generation projects in Mower County. One of the projects is the 100 MW Grand Meadow wind farm, owned by Xcel Energy. The second project is the 100 MW Wapsipinicon wind farm, from which Southern Minnesota Municipal Power Agency purchases the output. Both of these wind generators are operational, but until these new transmission upgrades are constructed, they can be limited in the amount of power they deliver to the system. The Project will also provide additional outlet capability to serve future generators in the Pleasant Valley Substation area.

The Pleasant Valley – Byron 161 kV Line is one of three 161 kV transmission line project recommended in the August 2008 Regional Incremental Generation Outlet ("RIGO") Study to increase generation outlet capability in the Pleasant Valley Substation area. The two other recommended 161 kV transmission line projects are: 1) a 161 kV transmission line approximately 25 miles long, connecting the Pleasant Valley Substation to the existing Willow Creek Substation in Rochester with a new intermediate St. Bridgets Substation located three miles south of the Willow Creek Substation; and 2) a 161 kV transmission line, approximately seven miles long, from the Byron Substation to the Rochester Public Utilities' new Westside Substation.

Figure 1: Project Location Map



The Pleasant Valley – Byron 161 kV Line and related components will provide approximately 350 MW of additional outlet capacity, provided it is constructed on a new right-of-way. If all three projects are built, there would be 700 MW of additional system capacity (350 MW over and above the 350 MW provided by the Pleasant Valley – Byron 161 kV Line). Also, as part of the RIGO study effort, planning engineers recognized that the new 161 kV facilities would increase the import capabilities of the transmission system serving the Rochester area which would improve local community reliability.

It is anticipated that all three transmission line projects will be constructed. However, at this time, Xcel Energy seeks a Route Permit for only the Pleasant Valley – Byron 161 kV Line. The Pleasant Valley – Willow Creek 161 kV and Byron – Westside 161 kV lines are not part of this Application.

Detailed information about the need for the 161 kV transmission line is provided in Xcel Energy's application for a Certificate of Need in MPUC Docket No. E002/CN-08-992.

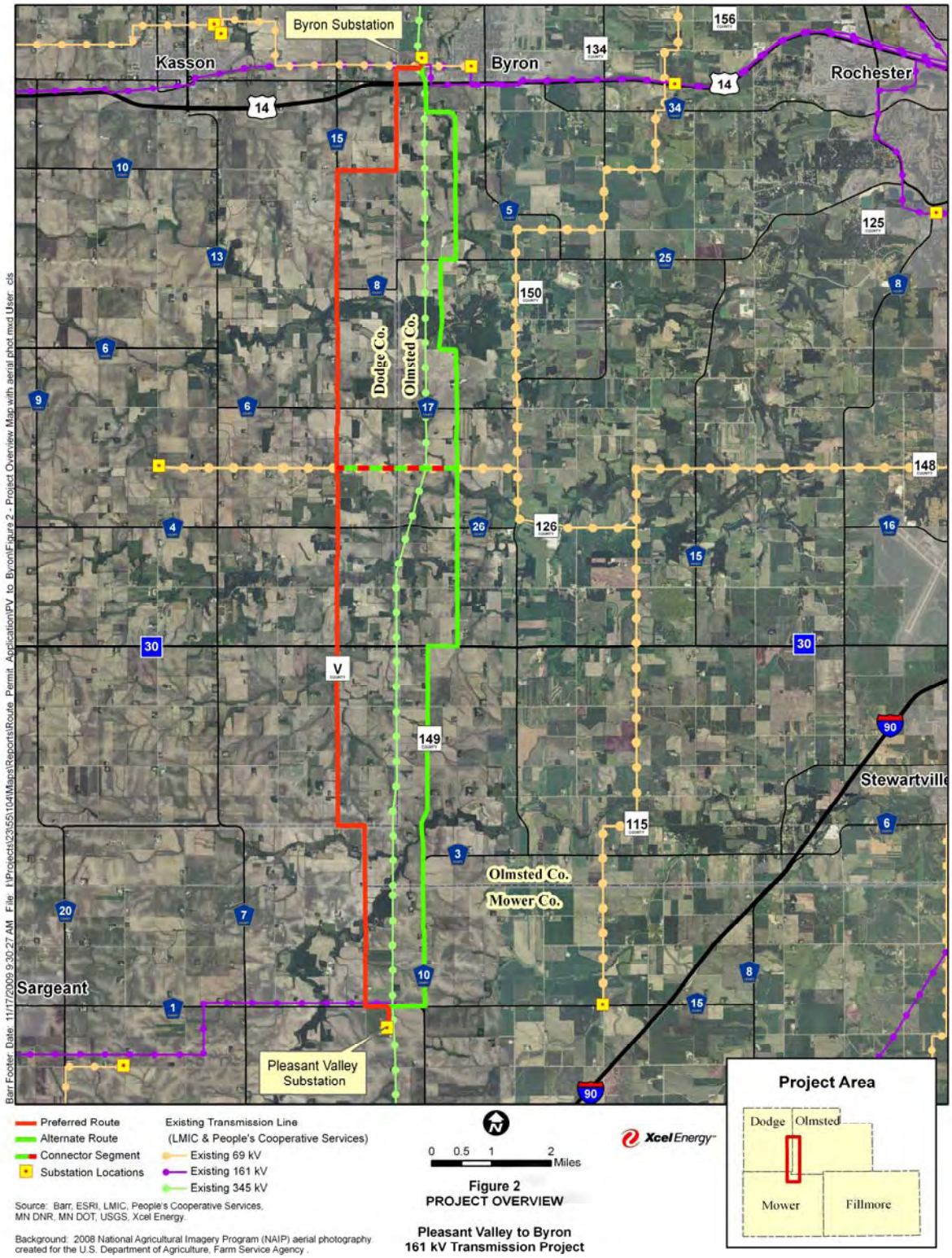
1.3 Project Description

The Project includes an 18 mile long 161 kV transmission line that runs south to north from a substation in Pleasant Valley Township to a substation in the City of Byron, the Pleasant Valley – Byron 161 kV Line. Figure 2 shows the proposed Project.

The proposed structures are single-pole, weathering-steel, brace-post type structures. The height of the poles will range from 70 to 90 feet, with the spans between poles ranging from 400 to 650 feet. The typical right-of-way width for the transmission line will be 80 feet.

Xcel Energy proposes to construct the 161 kV transmission line, with an anticipated in-service date of Fourth Quarter 2011. The estimated cost of the Preferred Route is $10.5 million (escalated dollars). The Project also includes modifications to the Pleasant Valley Substation and the Byron Substation as described in Section 3.4.

Figure 2: Project Overview



1.4 Proposed Routes

Xcel Energy developed two proposed routes for the Pleasant Valley – Byron 161 kV Line, which are identified as the "Preferred Route" and the "Alternate Route." The two routes follow existing rights-of-way and property lines to the extent feasible. The two routes share a common optional two-mile east/west segment, the "Connector Segment." A general description of the proposed routes is provided below. Figure 3 identifies the Preferred Route and the Alternate Route. A detailed analysis of each route is presented in subsequent sections of this Application.

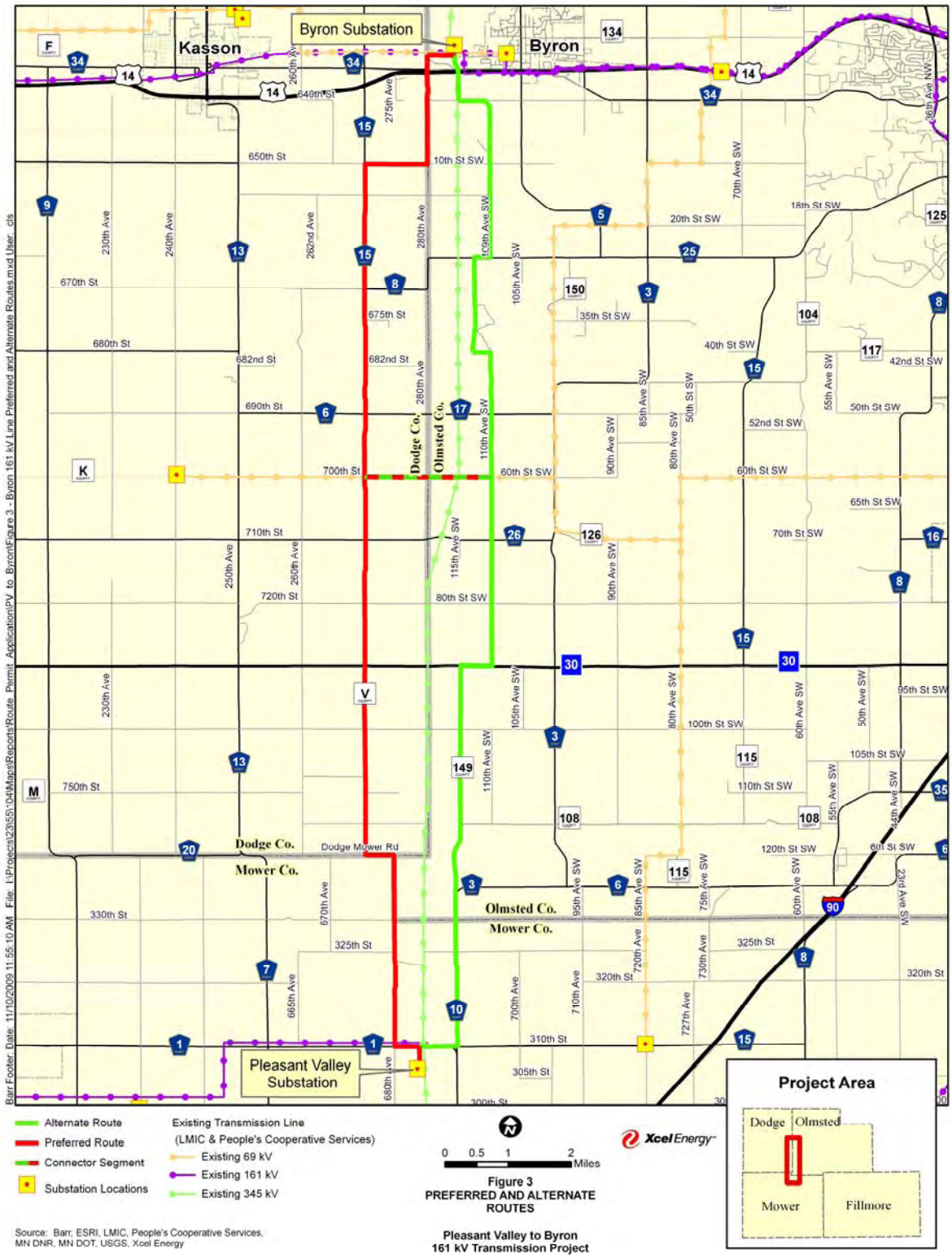
The proposed transmission line would interconnect the existing Pleasant Valley Substation and the existing Byron Substation. See Figure 3. The Pleasant Valley Substation is located in Mower County, southwest of the intersection of County State Aid Highway ("CSAH") 1 and CSAH 10. The Byron Substation is located on the west edge of the City of Byron in Olmstead County, northeast of the intersection of U.S. Highway 14 and 280th Avenue.

1.4.1 Preferred Route

The Preferred Route is approximately 18.3 miles long and crosses Mower, Dodge and Olmstead counties. After exiting the Pleasant Valley Substation, the route parallels CSAH 1 for a short distance, then primarily parallels CSAH 15 until terminating at the Byron Substation and land owned by Xcel Energy. The Preferred Route is described in detail in Sections 4 and 6 of this Application.

The Preferred Route is within or adjacent to the existing rights-of-way of roads and highways for approximately 96 percent of the length of the line. More than 95 percent of the route crosses rural or agricultural land with less than 2 percent of the line crossing either Xcel Energy or Great River Energy property adjacent to the substations and about 3 percent crossing within the City of Byron. Within the City of Bryon, the City owns some of the property; however the area is primarily under private ownership. There are 25 residences located within 300 feet of the route centerline, with 10 residences that may require tree removal. Twelve cultural resource sites are recorded within 0.5 miles of the route, including three archaeological sites and nine historical sites.

Figure 3: Preferred and Alternate Routes



The Preferred Route would cross eight public waters inventory ("PWI") watercourses. The route also crosses numerous grassy waterways in fields and would span approximately 1.5 miles of wetland. Five rare and unique species have been identified within one mile of the route.

The Applicant requests that the Commission approve the Preferred Route and authorize a total route width of 400 feet. A 400-foot route width would extend 200 feet on either side of the existing linear features that the proposed 161 kV transmission line would primarily parallel.

Xcel Energy proposes to construct the 161 kV transmission line, with an anticipated in-service date of Fourth Quarter 2011. The estimated cost of the Preferred Route is $ 10.5 million (escalated dollars).

1.4.2 Alternate Route

The Alternate Route is approximately 18.2 miles long and crosses Mower and Olmstead counties. See Figure 3. After exiting the Pleasant Valley Substation, the route parallels CSAH 1 and CSAH 15 for a short distance, then the route primarily parallels County Road 149 and 110th Avenue SW until terminating at the Byron Substation. The Alternate Route is described in detail in Sections 4 and 6 of this Application.

The Alternate Route is within or adjacent to the existing rights-of-way of roads and highways for approximately 88 percent of the length of the line, with the remainder of the route paralleling section lines and crossing agricultural and wooded areas. More than 97 percent of the route crosses rural or agricultural land with less than 2 percent of the line crossing either Xcel Energy or Great River Energy property adjacent to the substations and about 1 percent crossing within the City of Byron. Within the City of Bryon, the property is under City and private ownership. There are 26 residences located within 300 feet of the route centerline, with seven residences that may require tree removal. Six cultural resource sites were identified within 0.5 miles of the route, including one archaeological site and five historical sites. The route would cross seven PWI watercourses, numerous grassy waterways in fields and would span

approximately 1.2 miles of wetland. Four rare and unique species have been identified within one mile of the route.

The requested 400-foot route width would extend 200 feet on either side of the existing linear features that the proposed 161 kV transmission line would parallel. In one location, Xcel Energy requests a route width of 1,000 feet. A 1,000-foot route width would extend 500 feet on either side of buildings within an industrial area located south of the Byron Substation. See Appendix A, Figure A-4.

Xcel Energy proposes to construct the 161 kV transmission line, with an anticipated in-service date of Fourth Quarter 2011. The estimated cost of the Alternate Route is $10.9 million (escalated dollars).

1.4.3 Connector Segment

The Connector Segment is two miles long and crosses both Dodge and Olmsted counties. The segment connects the midpoints of the Preferred Route and the Alternate Route. The west end of the segment is located at the intersection of County Road 15 and 700th Street in Dodge County. The east end of the segment is located at the intersection of 60th Street SW and 110th Avenue SW in Olmstead County. See Figure 3. The Connector Segment was considered for alternative routes and follows an existing People's Cooperative Services 69 kV transmission line. The Connector Segment is described in detail in Sections 4 and 6.

The Connector Segment is within or adjacent to the existing road and transmission line rights-of-way for the entire segment. There is an existing transmission line along this segment. The segment crosses rural or agricultural land. There are three residences located within 300 feet of the segment centerline, with one residence that may require tree removal. No cultural sites were identified within 0.5 miles of this segment. The segment would cross two intermittent streams, no PWI watercourses and would span 0.2 miles of wetland. Five rare and unique species have been identified within one mile of the route.

Route Development

In developing the routes proposed in this Application, Xcel Energy analyzed the statutory and rule factors set forth in the Power Plant Siting Act ("PPSA"), Minn. Stat. Ch. 216E and Minn. R. Ch. 7850. Xcel Energy also gave due consideration to the State's policy of non-proliferation of new infrastructure corridors and met with interested stakeholders, including state agencies.

1.6 Environmental Impacts

Although the Project Area contains both urban and rural land uses, as well as natural resource, cultural resource and recreation areas, Xcel Energy has not identified any environmental factor that would preclude construction of the proposed facilities. No displacement of residences is anticipated. Permanent impacts would be limited to transmission structures and to areas immediately next to each structure sited on agricultural land. All other impacts can be avoided or minimized through careful route selection, final design and reliance on construction Best Management Practices ("BMPs").

1.7 Requested Action

This Application is submitted under the Full Permitting Process. Minn. Stat. § 216E.03 and Minn. R. 7850.1700-7850.2700. The applicable statutes and rules require that an applicant provide at least two proposed routes for a project and state a preference for one of the proposed routes (Minn. Stat. § 216E.03, Subd. 3; Minn. R. 7850.1900, Subp. 2(C)). Therefore, Xcel Energy is submitting one Preferred Route and one Alternate Route for the Pleasant Valley – Byron 161 kV Line, and prefers approval of the Preferred Route.

This Application demonstrates that construction of the Project along the Preferred or Alternate Route would comply with the applicable standards and criteria set out in Minn. Stat. § 216E.03, Subd. 7 and Minn. R. 7850.4100. This Project will support the State's goals to conserve resources, minimize environmental and human settlement impacts and land use conflicts, and ensure the State's electric energy security through the construction of efficient, cost-effective infrastructure.

1.8 Next Steps

The Commission will determine whether this Application is complete and, if so, refer the matter to the Office of Administrative Hearings. An Administrative Law Judge ("ALJ") will preside at a contested case hearing and make a recommendation to the Commission. As part of the routing proceeding, the Minnesota Department of Commerce, Office of Energy Security ("OES"), Energy Facility Permitting Staff will prepare an Environmental Impact Statement ("EIS"). The ALJ's recommendation and the EIS will be forwarded to the Commission for consideration in making its decision.

1.9 Completeness Checklist

The content requirements for an application with the Commission under the Full Permitting Process are identified in Minn. Stat. § 216E.03 and Minn. R. 7850.1700 through 7850.1900, Subp. 2 and 3. Table 1 lists the rule requirements and the section where the information can be found in this Application.

Table 1: Route Permit Completeness Checklist

Authority	Required Information	Section
Minn. Rules 7850.1900, Subp. 2 - Route Permit for a High Voltage Transmission Line ("HVTL")		
A.	A statement of proposed ownership of the facility at the time of filing the Application and after commercial operation.	2.2
B.	The precise name of any person or organization to be initially named as permittee or permittees and the name of any other person to whom the Route Permit may be transferred if transfer of the Route Permit is contemplated.	2.1
C.	At least two proposed routes for the proposed HVTL and identification of the preferred route and the reasons for the preference.	4.0
D.	A description of the proposed HVTL and all associated facilities, including the size and type of the HVTL.	5.0
E.	The environmental information required under Minn. Rules 7850.1900, Subp. 3.	6.0
F.	Identification of land uses and environmental conditions along the proposed routes.	6.0
G.	The names of each owner whose property is within any of the proposed routes for the HVTL.	Appendix B
H.	United States Geological Survey ("USGS") topographical maps or other maps acceptable to the Commission showing the entire length of the HVTL on all proposed routes.	Appendix A and Figures 1-4
I.	Identification of existing utility and public rights-of-way along or parallel to the proposed routes that have the potential to share right-of-way with the proposed HVTL.	4.0
J.	The engineering and operational design concepts for the proposed HVTL, including information on the electric and magnetic fields of the HVTL.	5.0
K.	Cost analysis of each route, including the costs of constructing, operating and maintaining the HVTL that are dependent on design and route.	3.6
L.	A description of possible design options to accommodate expansion of the HVTL in the future.	4.8
M.	The procedures and practices proposed for the acquisition and restoration of the right-of-way and for construction and maintenance of the HVTL.	5.3
N.	A listing and brief description of federal, state and local permits that may be required for the proposed HVTL.	7.0
O.	A copy of the Certificate of Need or the certified HVTL list containing the proposed HVTL or documentation that an application for a Certificate of Need has been submitted or is not required.	Filed Concurrently
Minn. Rules 7850.1900, Subp. 3 - Environmental Information		
A.	A description of the environmental setting for each site or route.	6.1
B.	A description of the effects of construction and operation of the facility on human settlement, including, but not limited to, public health and safety, displacement, noise, aesthetics, socioeconomic impacts, cultural values, recreation and public services.	6.2
C.	A description of the effects of the facility on land-based economies, including, but not limited to, agriculture, forestry, tourism and mining.	6.3
D.	A description of the effects of the facility on archaeological and historic resources.	6.3
E.	A description of the effects of the facility on the natural environment, including effects on air and water quality resources and flora and fauna.	6.4
F.	A description of the effects of the facility on rare and unique natural resources.	6.4
G.	Identification of human and natural environmental effects that cannot be avoided if the facility is approved at a specific site or route.	6.0
H.	A description of measures that might be implemented to mitigate the potential human and environmental impacts identified in items A to G and the estimated costs of such mitigation measures.	6.0

2.0 Introduction

Xcel Energy is a Minnesota corporation with its headquarters in Minneapolis, Minnesota. Xcel Energy is a wholly owned subsidiary of Xcel Energy Inc., a utility holding company with its headquarters in Minneapolis. Xcel Energy provides electricity services to approximately 1.2 million customers and natural gas services to 425,000 residential, commercial and industrial customers in Minnesota. Xcel Energy also provides electricity service to more than 73,000 customers in South Dakota and 55,000 customers in North Dakota.

Xcel Energy Services Inc. is the service company for Xcel Energy Inc. holding company system and its personnel prepare, submit and administer regulatory applications to the Commission on behalf of Xcel Energy, including Route Permit applications.

2.1 Permittee

The permittee for the proposed Project is:

Permittees:	Northern States Power Company
Contacts:	Tom Hillstrom
	Routing Team Leader
Addresses:	Xcel Energy Services Inc.
	414 Nicollet Mall, MP-8A
	Minneapolis, MN 55401
Phone:	612-330-6538
Email:	thomas.g.hillstrom@xcelenergy.com

2.2 Statement of Ownership

Xcel Energy will construct, own and operate the line between the Pleasant Valley Substation and the Byron Substation. See Figure 3.

2.3 Certificate of Need

No large energy facility shall be sited or constructed in Minnesota without the issuance of a Certificate of Need by the Commission. Minn. Stat. § 216B.243, Subd. 2. Any high-voltage transmission line with a capacity of 100 kV or more and that is more than 10 miles in length is considered a "large energy facility." See Minn. Stat. § 216B.2421, Subd. 3. Therefore, a Certificate of Need is required for this Project before the Commission can issue a Route Permit. Minn. R. 7850.2700, Subp. 3. The Application for a Certificate of Need from the Commission will be filed concurrently with the Pleasant Valley – Bryon 161 kV Line Route Permit Application in MPUC Docket No. E002/CN-08-992.

The Pleasant Valley – Byron 161 kV Line, along with Pleasant Valley Substation modifications are needed to serve the existing 100 MW wind generation projects (Grand Meadow and Wapsipinicon wind farms) and to provide additional outlet capability to serve future generators in the Pleasant Valley Substation area.

2.4 Route Permit

The PPSA provides that no person may construct a High Voltage Transmission Line ("HVTL") without a Route Permit from the Commission. Minn. Stat. § 216E.03, Subd. 2. Under the PPSA, an HVTL includes a transmission line that is 100 kV or more and is greater than 1,500 feet in length. Minn. Stat. § 216E.01, Subd. 4. The proposed 161 kV transmission line is an HVTL and therefore a Route Permit is required prior to construction.

3.0 Project Information

3.1 Project Area

The Proposed Project is located in Dodge, Mower and Olmstead counties. Figure 2 shows an overview of the Project Area. Appendix A includes detailed maps of the townships crossed by the proposed routes and the substations described in this Application. Table 2 identifies the cities, townships and local government units ("LGUs") in the Project Area.

Table 2: Affected Local Government Units[1]

City /Township Name	Township (N)	Range (W)	Sections
City of Byron			
Townships - Preferred Route			
Canisteo	106	16	1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35, 36
High Forest	104	15	6
Kalmar	107	15	31
Mantorville	107	16	36
Pleasant Valley	104	15	7, 18, 19
Salem	106	15	6, 7
Sergeant	104	16	1, 12, 13, 24
Vernon	105	16	1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35, 36
Townships - Alternate Route			
Pleasant Valley	104	15	7, 8, 17, 18, 19, 20
High Forest	104	15	5, 6
Rock Dell	105	15	5, 6, 7, 8, 17, 18, 19, 20, 30, 31
Salem	106	15	5, 6, 7, 8, 17, 18, 19, 29, 30, 31, 32
Kalmar	107	15	31

[1] "Affected" indicates that at least a portion of the route crosses the annexed boundaries of the municipality or township.

Notice to Local Government Units

Xcel Energy provided notification letter to the LGUs identified in Table 2 on October 6, 2008. See Appendix F for the LGU mailing list. This notification letter identified that Xcel Energy intended to apply for a Route Permit for the Project from the Commission. The notification letter to the LGUs complies with the requirement of Minn. Stat. § 216E.03, Subd. 3a. See Appendix F for a copy of this letter.

3.2 Project Proposal

Xcel Energy proposes to construct the proposed Pleasant Valley – Byron 161 kV Line as a single-circuit line on single-pole, galvanized weathering-steel structures with brace posts. The height of the poles will range from 70 to 90 feet. The spans between poles are expected to range from 400 to 650 feet. The typical right-of-way width for the transmission line will be 80 feet. See Figure 3.

Modifications to two existing substations are required to accommodate the Pleasant Valley – Byron 161 kV Line. These specific modifications are described in Section 3.4.

3.3 Route Width and Alignments

3.3.1 Route Width

The PPSA, Minn. Stat. Ch. 216E, directs the Commission to locate transmission lines in a manner that "minimize[s] adverse human and environmental impact while ensuring continuing electric power system reliability and integrity and ensuring their electric needs are met and fulfilled in an orderly and timely fashion." Minn. Stat. § 216E.02, Subd. 1. The PPSA also authorizes the Commission to meet its routing responsibility by designating a "route" for a new transmission line when it issues a Route Permit. The route may have "a variable width of up to 1.25 miles," within which the right-of-way for the facilities can be located. Minn. Stat. § 216E.01, Subd. 8.

Xcel Energy requests that in general the Commission authorize a route width of 200 feet on each side of the route alignment (400 feet total width). Xcel Energy requests a route up to 1,000 feet in width in one specific area located south of the Byron Substation. See Appendix A, Figure A4. The wider route will allow additional flexibility during detailed engineering and design. These exceptions are described in Section 4.6. The Project is not expected to displace any residences or businesses. Detailed maps showing currently planned route widths and proposed alignments are provided in Appendix A.

3.3.2 Alignments

In developing the routes proposed in this Application, Xcel Energy analyzed the statutory and rule factors set forth in the PPSA, Minn. Stat. Ch. 216E and Minn. R. Ch. 7850. The routes studied were 400-foot wide corridors based on geographic features deemed appropriate for transmission line routing. As route options were identified, Xcel Energy refined its study and calculated impacts based on various potential alignments or transmission line centerlines within the routes. The detailed maps in the Appendix show a conceptual alignment that was used to calculate impacts. The alignment shown on these maps is based on information available at the time of filing and is Xcel's best estimate of where the line could be built to minimize impacts. The actual construction alignment will likely change during final engineering.

3.4 Associated Facilities

The associated facilities for the Project include modifications to and equipment additions at the existing Pleasant Valley and Byron substations. No additional land is needed for those modifications.

3.4.1 Pleasant Valley Substation (Existing)

This substation will be modified by Great River Energy to accommodate the Pleasant Valley – Byron 161 kV Line. The upgrades will include new circuit breakers for protecting the new transmission line, as well as bus work and switches to complete connections. No additional grading work will be needed. All new equipment will be installed within the existing substation fence. This substation work is being constructed contemporaneously with direct interconnection facilities that are required by the wind farms. This substation work has been permitted locally.

3.4.2 Byron Substation (Existing)

The substation in the City of Byron will be modified by Southern Minnesota Municipal Power Agency ("SMMPA") to accommodate the transmission line. A new 161 kV line terminal bay will be added as well as a new 161 kV circuit breaker and

associated switches, bus and controls. Upgrades at the substation control building are also required. The upgrades include the rewiring of existing controls and the installation of three new control panels with protection devices. All new equipment will be installed within the existing substation fence. This work is being separately permitted by SMMPA.

3.5 Project Schedule

Construction for the Project is expected to begin in first quarter 2011, and Xcel Energy anticipates a Fourth Quarter 2011 in-service date for the transmission line. Table 3 provides a permitting and construction schedule summary.

This schedule is based on information known as of the date of this filing and upon planning assumptions that balance the timing of implementation with the availability of crews and materials and with other practical considerations. This schedule may be subject to revision as further information is developed.

Table 3: Project Schedule

Project Task	Date
Submit Route Permit Application	November 2009
Route Permit Review Process Complete	December 2010
Begin Line & Substation Design	June 2010
Begin Right-of-Way Acquisition	November 2010
Begin Transmission Line & Substation Construction	February 2011
In-Service Date	Fourth Quarter 2011
Final Right-of-Way Contacts & Cleanup Complete	December 1, 2011

3.6 Project Cost

The Project cost, depending on route selection, is summarized in Table 4.

Table 4: Project Cost

Project Item	Cost
Preferred Route Project	$ 10,500,000
Alternate Route Project	$ 10,900,000

See Section 5.3.3 for details about maintenance costs.

4.0 Route Alternatives

The proposed transmission line will be located between the Pleasant Valley Substation, located in Mower County, and the Byron Substation, located in the City of Byron in Olmstead County. Two potential routes were identified for the line – the Preferred Route and the Alternate Route.

The potential routes are located within about one mile of the county line between Dodge and Olmstead counties, with the Preferred Route crossing primarily through Dodge County and the Alternate Route crossing primarily through Olmstead County. The two routes share a common optional two-mile east/west segment, or Connector Segment. The routes are described in more detail below.

4.1 Preferred Route Description

The Preferred Route is 18.3 miles long and is divided into two major segments: the Southwest Segment and the Northwest Segment. See Figure 3. Table 5 provides a detailed description of the route segments, including road, river and PWI crossings.

Southwest Segment: The southwest segment is 9.1 miles long. Beginning at the Pleasant Valley Substation, the line heads north out of the substation to 310th Street, turning west for approximately 0.4 miles before turning north into Dodge County on County Road V and CSAH 15. Approximately 97 percent of this segment follows existing road rights-of-way. There are 8 residences located within 300 feet of the route centerline, with 7 residences that may require tree removal.

Northwest Segment: The northwest segment is 9.2 miles long. The segment begins at 700th Street, travels north along Highway 15 for 5 miles, and continues east along 650th Street for one mile to the boundary of Dodge and Olmstead Counties. The route turns north along 280th Avenue SW for 1.7 miles and then turns east along the railroad tracks located on the south side of 4th Street NW, continuing into the City of Byron and Olmsted County, and ends at the Byron Substation. Approximately 95 percent of this segment follows existing road rights-of-way, primarily in Dodge County along CSAH 15. There are 17 residences located within 300 feet of the route centerline, with 3 residences that may require tree removal.

Table 5: Preferred Route Description

Route Direction	Approximate Distance	Road and Public Waters Crossings
START ROUTE AT PLEASANT VALLEY SUBSTATION		
Southwest Segment		
NORTH to 310th Street	0.2 miles	None
WEST along 310th Street to 680th Avenue	0.4 miles	None
NORTH along 680th Avenue to Mower County and Olmsted County Boundary	2.0 miles	Cross North Branch Root River at 1.4 mile.
NORTH along 680th Avenue to Dodge County Boundary	1.0 miles	Follows along Mower County and Olmstead County boundaries for 0.5 mile; Cross Sargeant Creek at 0.6 mile.
West along Dodge Mower Road to County Road V	0.5 miles	None
NORTH along County Road V (270th Avenue) to State Highway 30	3.0 miles	Cross 755th Street at 0.5 miles; Cross 740th Street at 2.0 mile; Cross Public Water Stream at 2.1 mile; Cross Public Water Stream at 2.4 mile; Cross Public Water Stream at 2.5 mile; Cross State Highway 30 at 3.0 mile.
NORTH along CSAH 15 to Connector Segment	3.0 miles	Cross 720th Street at 1.0 mile; Cross South Fork Zumbro River at 1.06 mile; Cross 710th Street (CSAH 4) at 2.0 mile; ends at 700th Street.
Connector Segment		Location of east to west segment
Northwest Segment		
NORTH along CSAH 15 to 650th Street	5.0 miles	Begins at 700th Street; Cross CSAH 6 at 1.5 mile; Cross Salem Creek at 3.3 mile; Cross County Hwy 8 at 3.5 mile; Cross 665th Street at 5.0 mile.
EAST along 650th to 120th Avenue SW	1.0 miles	None
NORTH along 280th Avenue to railroad tracks	1.7 miles	Cross U.S. Highway 14 at 1.4 mile; Cross Cascade Creek at 1.3 mile; Parallel the Dodge County and Olmsted County boundaries for 1.7 miles.
EAST along railroad tracks	0.4 miles	Cross 280th Avenue at 0.01 mile.
NORTH into Byron Substation	0.1 miles	Cross 4th Street NW at 0.03 mile.
END OF ROUTE AT BYRON SUBSTATION	End of Route	None
Total Length of Route	18.3 miles	

4.2 Alternate Route Description

The Alternate Route is 18.2 miles long and is divided into a Southeast Segment and a Northeast Segment. See Figure 3. Table 6 provides a detailed description of the route segments, including road, river and stream crossings located along the route.

Southeast Segment: The southeast segment is 10.4 miles long. Beginning at the Pleasant Valley Substation, the line extends approximately 2.0 miles east in Mower County along 310th Street before turning north into Olmstead County along CSAH 10, CSAH 3, County Road 149 and 110th Avenue. The segment ends at 60th Street SW. Approximately 97 percent of this segment follows existing road rights-of-way. There are 11 residences located within 300 feet of the route centerline, with 3 residences that may require tree removal.

Northeast Segment: The northeast segment is 7.8 miles long and is located entirely in Olmstead County. This segment begins at 60th Street SW, travels north along 110th Avenue SW to 40th Street SW. At this point, the line turns west for 0.3 miles, then turns north and travels cross-country for 1.2 miles to CSAH 25, turns east for 0.3 miles to 109th Avenue SW, and then travels north and west to the Byron Substation. Approximately 79 percent of the route follows existing road rights-of-way, primarily along 110th Avenue and 109th Avenue. Approximately 22 percent of this segment runs cross-country. There are 15 residences located within 300 feet of the route centerline, with 4 residences that may require tree removal.

Table 6: Alternate Route Description

Route Direction	Approximate Distance	Road and Public Waters Crossings
START ROUTE AT PLEASANT VALLEY SUBSTATION		
Southeast Segment		
NORTH to 310th Street	0.2 miles	None
EAST along 310th Street to 690th Avenue	0.6 miles	None
NORTH along CSAH 10 (690th Avenue) to Mower County and Olmsted County boundaries	2.0 miles	Cross the Mower County and Olmsted County boundary at 2.0 mile; Cross 325th Street at 1.5 mile.
NORTH along CSAH 3	0.5 miles	None
NORTH along County Road 149	3.6 miles	Cross North Branch Root River at 0.4 mile; Cross County Road 108 at 1.1 mile; Cross 100th Street SW at 2.5 mile.
EAST along State Highway 30	0.5 miles	None
NORTH along 110th Avenue SW to Connector Segment	3.0 miles	Cross 80th Street SW at 1.0 mile; Cross CSAH 26 at 2.0 mile; ends at 60th Street SW.
Connector Segment		Location of east to west segment
Northeast Segment		
NORTH along 110th Avenue SW to 40th Street SW	2.0 miles	Begins at 60th Street SW; Cross Zumbro River at 0.2 mile; Cross 60th Street SW at 0.5 mile; Cross CSAH 17 at 1.5 mile.
WEST along 40th Street SW	0.3 miles	None
NORTH cross-country to 110th Avenue SW	0.7 miles	Cross Salem Creek at 0.4 mile.
NORTH along 110th Avenue SW to CSAH 25	0.7 miles	None
EAST along CSAH 25	0.2 miles	None
NORTH along 109th Avenue SW	1.7 miles	Cross Public Water Stream at 0.7 mile; 'T' intersection with 15th Street SW at 1.0 mile; Cross 10th Street SW at 1.4 mile.
NORTH cross-country	0.9 miles	Cross Cascade Creek at 0.1 mile.
WEST along Frontier Road SE	0.4 miles	None
NORTH cross-country to 4th Street NW	0.8 miles	Cross U.S. Highway 14 at 0.5 mile; Continues west of buildings and east of pond to 4th Street NW.
NORTH to Byron Substation	0.1 miles	None
END ROUTE AT BYRON SUBSTATION	End of Route	None
Total Length of Route	18.2 miles	

4.3 "Connector" Segment

The two-mile Connector Segment crosses both Dodge and Olmsted counties. The west-east segment is located along 700th Street in Dodge County and along 60th Street SW in Olmstead County. See Figure 3. The Connector Segment was considered for alternative routes and follows an existing People's Cooperative Services 69 kV transmission line. The entire segment follows existing road and transmission line

rights-of-way. There is one residence located within 300 feet of the route centerline that would not require tree removal.

4.4 Structure Options Along the Preferred and Alternate Routes

The entire transmission line would primarily be constructed with single-circuit, single-pole weathering-steel structures. The exception is near the Byron Substation where double-pole structures will be required in order to cross under the existing Prairie Island – Byron – Adams 345 kV line to access the substation. The double-pole structures will be needed shorter poles so that the line can pass under the 345 kV line.

4.5 Proposed Route Width

In general, Xcel Energy requests a route width of 200 feet on each side of the road centerline (400 feet total width). The exception to this route width is provided below.

Preferred Route

This width should be sufficient to allow for any adjustments required during detailed design of the Preferred Route.

Alternate Route

Along all but one section of the Alternate Route, a route width of 400 feet (total width) should be sufficient to allow for any adjustments required during detailed design. Xcel Energy, however, requests a wider route in one location: a 1,000-foot wide route (total width) in the area just south of the Byron substation where the proposed Alternate Route passes between buildings in an industrial park. See Appendix A, Figure A-4. The wider route is needed in this area to provide flexibility during detailed design to develop the best method for avoiding buildings and crossing under the Prairie Island – Byron – Adams 345 kV line.

4.6 Route Selection Process

The Preferred Route and the Alternate Route were developed by Xcel Energy's routing and engineering personnel based on their investigation of the overall Project

Area and on input from the public and government agencies about how to minimize impacts. The Project Area was initially studied during the planning process by a team of siting, right-of-way, ecological and engineering personnel. The team reviewed the general area identified for significant routing issues that might arise. Field studies were conducted to identify natural resources along the route alternatives. After consulting with affected landowners, the team developed further route alternatives using the process described below.

4.6.1 Initial Route Selection Criteria

The route evaluation and selection process involved a series of increasingly detailed reviews of potential route options using both Geographic Information System ("GIS") and field verification. The initial mapping used aerial photographs, topographic maps and GIS data. Aerial photography, as well as zoning and parcel data and data regarding the locations of existing wind towers, was obtained from Olmsted County and the MnDNR. Soil data was obtained from the United States Department of Agriculture - Natural Resources Conservation Service ("USDA-NRCS"), and floodplain information was obtained from Federal Emergency Management Agency ("FEMA"). The MnDNR Data Deli was accessed for information on native plant communities, sites with biodiversity significance, streams and lakes, wildlife management areas and rare natural features. The United States Fish and Wildlife Service ("USFWS") National Wetlands Inventory ("NWI") was used to identify wetlands in the Project Area. In addition, the Minnesota State Historic Preservation Office ("SHPO") was consulted as part of a Cultural Resources Report (Gronhovd, 2008; Appendix C) to identify sites within the Project Area that have archaeological or historic significance.

Route Development Process

The routes were developed by Xcel Energy's routing and engineering personnel based on its investigation of the overall Project Area. The routing team considered the location of the facilities; the location of existing distribution and transmission infrastructure; and input from the public and government entities about how to minimize impacts. Throughout the process, Xcel Energy evaluated several route alternatives, considering feedback provided at a public open house meeting and

through written comments. Xcel Energy also consulted with local, state and federal agencies associated with the Project Area.

To identify potential routes, Xcel Energy gathered environmental data, collected public comments and applied the factors listed in Minn. R. 7850.4100 and Minn. Stat. Section 216E.03, subdivision 7). The rule factors set forth in Minn. Rule 7850.4100 are as follows:

A. Effects on human settlement, including, but not limited to, displacement, noise, aesthetics, cultural values, recreation and public services.

B. Effects on public health and safety.

C. Effects on land-based economies, including, but not limited to, agriculture, forestry, tourism and mining.

D. Effects on archaeological and historic resources.

E. Effects on the natural environment, including effects on air and water quality resources and on flora and fauna.

F. Effects on rare and unique natural resources.

G. Application of design options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity.

H. Within, adjacent to or paralleling of existing rights-of-way, survey lines, natural division lines and agricultural field boundaries.

I. Use of existing large electric power generating plant sites.

J. Use of existing transportation, pipeline and electrical transmission systems or rights-of-way.

K. Electrical system reliability.

L. Costs of constructing, operating and maintaining the facility which are dependent on design and route.

M. Adverse human and natural environmental effects which cannot be avoided.

N. Irreversible and irretrievable commitments of resources.

All of these factors are included in the statutory criteria listed in Minn. Stat. § 216E.03, Subd. 7(b). There are also two additional factors included in Minn. Stat. § 216E.03, Subd. 7(b)(7) evaluation of route alternatives and (12) consideration of issues raised by other agencies and local entities. Xcel Energy also followed the State's policy of non-proliferation of infrastructure corridors, which establishes a strong preference for locating new transmission-line facilities along existing public rights-of-way, including transmission line and transportation rights-of-way. *See PEER v. Minnesota Environmental Quality Council*, 266 N.W.2d 858, 868 (Minn. 1978).

In analyzing various routes, Xcel Energy emphasized the following factors:

- Minimizing impacts to human settlement.
- Paralleling roads, railroads and existing transmission lines to help decrease the amount of new right-of-way required.
- Paralleling field lines and property lines, where access is adequate and the transmission line would cause minimal conflicts.
- Minimizing the length of the transmission line to reduce the impact area and costs for the Project.

The routes were further refined to avoid the following to the extent possible:

- Existing or planned residences.
- Areas where clearances are limited because of trees or nearby structures.

- Conflicts with agricultural areas, agricultural operations or other land uses.

- Areas with higher potential for archaeological or historic features or artifacts.

- Environmentally sensitive sites such as wetlands, areas with threatened and endangered species, areas of significant biological or cultural significance, and state and federal lands.

4.6.2 Public Participation

Agency/Government Coordination

In developing the Route alternatives, Xcel Energy consulted with local, state and federal agencies associated with the Project Area. Agencies generally responded by requesting to be updated on further Project developments and informing Xcel Energy of required permits for the Project along with specific applicable guidelines, rules and regulations. Xcel Energy will continue to communicate with these agencies throughout the routing process.

Xcel Energy met with the Olmstead County Planning Department ("OCPD") on September 4, 2008. Issues identified during the meeting included future roadway and transportation plans.

Xcel Energy met with Vernon Township and Dodge County officials on October 8, 2008. Issues identified during the meeting included wind development and the need to be connected to the electrical grid, farmland impacts, use of existing transmission line easements, and other existing transmission lines in the area.

Xcel Energy met with the City of Bryon on October 9, 2009. Issues identified during the meeting included the future Highway 14 interchange at 119th Avenue or CR 15.

Comments provided by the public agencies included requests to consider:

- Wind generation development in the Project Area and the need for transmission lines to handle the additional load.

- Using the existing 345 kV transmission line easement for the existing Prairie Island – Byron – Pleasant Valley 345 kV line as a proposed route for the proposed transmission line.

- Existing distribution lines and whether they would be buried, double-circuited, etc.

- Residences, buildings and trees that might be located along the proposed route.

- Effects on farmland, including access to fields and movement of equipment around pole structures and under lines.

- Future economic and residential growth in the Project Area.

- Future transportation projects in the Project Area.

Public Participation

After developing preliminary routes, Xcel Energy held an open house in Rochester on November 17, 2008, to seek input from the public and from state and local agencies. The purpose of the open house was to inform area landowners about the Project and to gather input early in the route selection process. The routes presented at the open house included the Preferred Route and the Alternate Route. Xcel Energy mailed notices or otherwise contacted potentially affected landowners in the Project Area to inform them of the open house. See Appendix B. Materials presented at the open house included a second line (Pleasant Valley to Willow Creek) that is not included in this Application.

Of the approximately 400 people that attended the open house, approximately 65 submitted written comments regarding the route for the Pleasant Valley – Bryon 161 kV Line during or following the event. See Appendix B. Primary issues raised by the public included:

- Need for the Project.
- Using the existing 345 kV transmission line easement as a proposed route for the transmission line.
- The existing distribution lines and whether they would be buried, double-circuited, etc.
- Residences, buildings and trees that might be located along the proposed route.
- Effects on farmland, including pole placement, easement issues, access to fields and movement of equipment around pole structures and under lines.
- Future transportation projects in the Project Area.
- Proximity of the line to residences, windrows (trees) and animals (cows, horses, etc.) in pastures.

Several alternative routes were suggested, as summarized in Section 4.9, and included:

- Alternative roads crossing the Project Area.
- Double-circuiting with or paralleling the existing Prairie Island – Byron – Pleasant Valley 345 kV transmission line.

These alternatives, including using other roads, were eliminated because they would affect more residences than the proposed routes.

Planning engineers evaluated whether the proposed transmission line could be double circuited with the existing 345 kV line and concluded that this configuration was not a reasonable alternative because it would affect reliability, complicate construction and increase costs. Planning engineers also determined that the proposed transmission line should be separated from the existing 345 kV line to minimize the risk that a single event, like a storm, could cause both lines to fail.

Because system performance would be affected by the double circuit alternative, the appropriateness of this configuration is a decision appropriately made in the Certificate of Need proceeding. Minn. Rule 7849.0120 B(1) (states that in a Certificate of Need Proceeding the Commission is to consider "the appropriateness of the size, the type, and the timing of the proposed facility compared to those of reasonable alternatives."). See MPUC Docket No. E002/CN-08-992.

Double circuiting is employed, for example, in situations where two circuits serve different functions or where high capacity (but not redundancy) is required. Double circuiting is not acceptable in situations where failure of both circuits would jeopardize reliability because of the substantially greater risk that both lines would be out simultaneously. For example, if storm damage caused a double circuit structure to fail, an outage would likely occur on both lines. Therefore, if it were determined under the relevant reliability rules that a simultaneous outage would jeopardize electrical service, double circuiting would not be allowed.

In this situation, both the 345 kV line and the proposed transmission line would serve the same purpose—providing an outlet for generation. The 345 kV line is currently constrained under certain conditions. Specifically, there is a Special Protection Scheme ("SPS") that requires curtailment of generation at the Pleasant Valley substation anytime there are high north-south flows on the 345 kV line. If the 345 kV line and proposed transmission line were double circuited, North American Electric Reliability Corporation ("NERC") Planning Standards would consider both of these circuits to be a "single contingency" type of event and generation would have to be curtailed on the new double circuited line. In other words, if the two lines are co-located, no additional outlet capacity is achieved. If the proposed transmission line is constructed on a separate right-of-way, this constraint will be eliminated.

The double circuiting alternative would also pose constructability concerns. In addition to providing an outlet for generation, the existing 345 kV line provides bulk transmission support to the Rochester Area. As a result, it would be very difficult to take this line out of service for the extended time period necessary for construction of a new double circuit line.

Accordingly, Xcel Energy has requested a Certificate of Need for the proposed transmission line to be constructed on new right-of-way.

4.6.3 Detailed Route Selection Criteria

There were 35 route segment alternatives evaluated during the selection of the Preferred Route and Alternate Route. See Figure 4. Alternatives were commonly eliminated in order to avoid impacts to residences, large forest complexes, long river valley crossings, establishment of new corridors and increased route length. Some alternatives were rejected because the connections to adjacent segments were rejected so there was no longer a connection to the route. See Appendix C for a list of eliminated route segment alternatives.

Once the overall route strategy was developed, Xcel Energy identified two routes. See Figure 3. The route impacts are summarized in Section 6. To evaluate these route options, Xcel Energy considered the following criteria in more detail:

- **Number of residences passed:** Rural residences and farmsteads are located along all of the roads that the routes would follow, with a higher density of residences near the City of Byron. To compare the alternatives, residences along the route alternatives were identified, and the number of residences within 40 feet, 100 feet and 300 feet of each alternative centerline was tabulated. See Table 7. These impacts for each alternative were then compared. There were 25 and 26 residences within 300 feet of the conceptual alignment centerline for the Preferred and Alternate routes, respectively.

- **Land Use Impacts**: The predominant land use that the routes cross is rural agriculture, including cropland and pastureland. To minimize impacts to farm fields, the Preferred Route primarily follows roads. To minimize land use impacts, the Preferred Route primarily follows existing infrastructure and shares roadway corridors.

Figure 4: Other Considered Route Alternatives

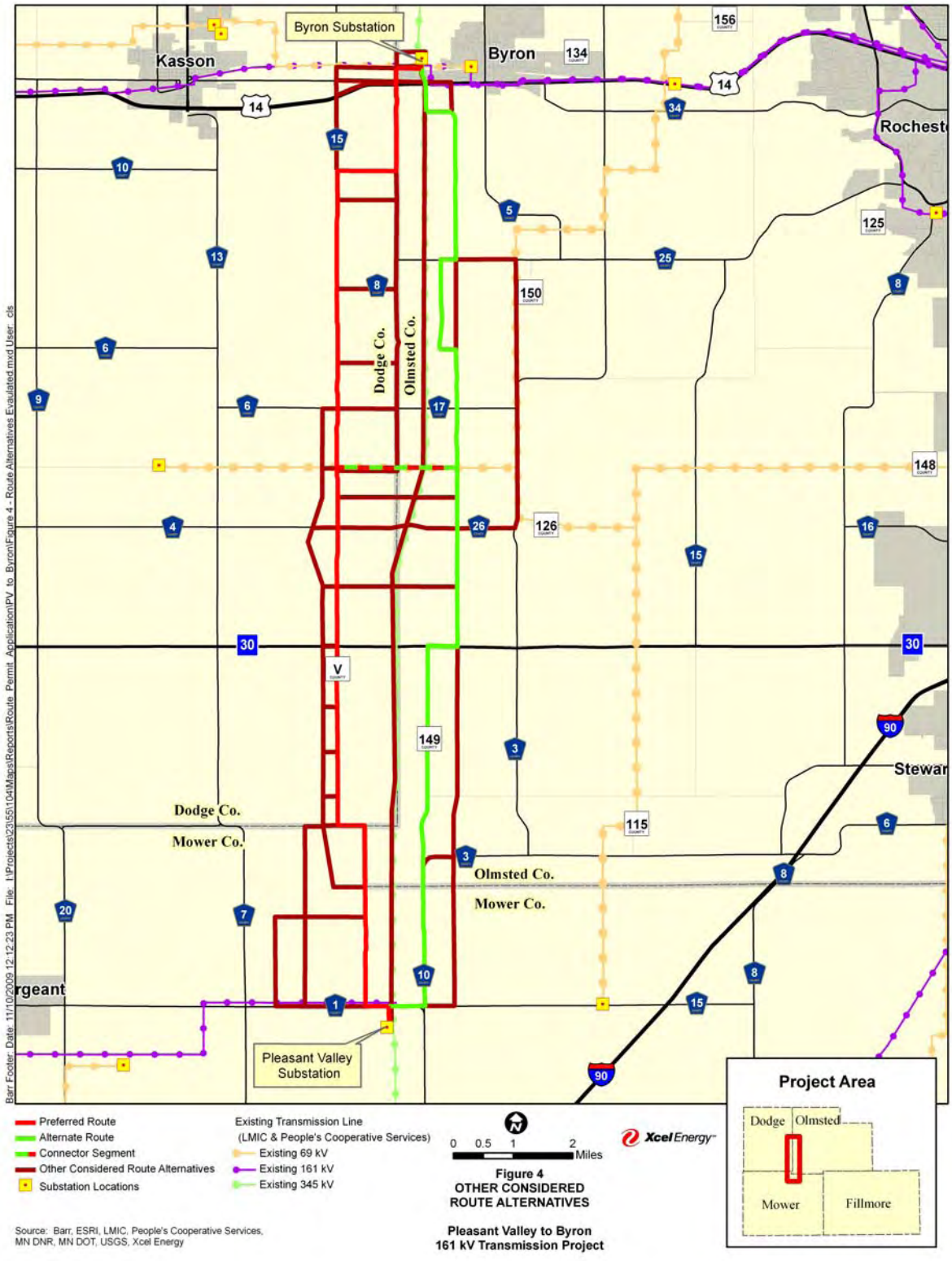


Figure 4
OTHER CONSIDERED ROUTE ALTERNATIVES

Pleasant Valley to Byron 161 kV Transmission Project

Table 7: Residences within 300 Feet of Preferred and Alternate Route Centerline

Route	Segment	Residences within 100 feet	Residences within 100-200 feet	Residences within 200-300 feet	Total Residences within 300 feet
Preferred Route (Segments: SW and NW)	SW	0	4	6	8
	NW	1	7	7	17
	Total	1	11	13	25
Alternate Route (Segments: SE and NE)	NE	0	8	3	11
	SE	0	6	9	15
	Total	0	14	12	26
Connector	---	0	1	2	3

- **Natural Resources**: Aside from agricultural land, other land cover types include windbreaks, forested areas, wetlands and streams. Trees are generally found in windbreaks associated with residences rather than in large tracts of forest. Tree impacts are minimized by moving the transmission line to the opposite side of the road to avoid residences wherever possible.

  Wetlands in the corridor that need to be spanned are primarily small emergent wetlands associated with streams or small depressions near or adjacent to the road. Four large wetland complexes along each route may need additional consideration during detailed design. Seven stream crossings are required for the Preferred Route and five for the Alternate Route; streams are generally narrow and include both perennial streams and drainage swale tributaries to the perennial streams.

  Spanning these smaller stream crossings should not pose a design or construction challenge. The Salem Creek crossing is common for both routes and may require additional design to span the river valley in both locations. See Section 6.4 for additional details on water resources.

- **Cultural Resources:** The entire Project Area may potentially contain archaeological sites, given the geography and history of the area. Past surveys in the area have uncovered cultural artifacts, particularly in areas with rolling topography near streams.

4.6.4 Final Route Selection

Using information gathered from government agencies and the public, Xcel Energy finalized the proposed Preferred Route and Alternate Route. While the data shows that the Preferred Route and Alternate Route will similarly minimize impacts, Xcel Energy believes the Preferred Route is best suited for the Project Area. Reasons for choosing the Preferred Route include:

- Within or adjacent to road rights-of-way and following existing property and fence lines helped to minimize land use impacts. Approximately 96 percent of the Preferred Route is within or adjacent to road rights-of-way, 2 percent is within or adjacent to railroad/road rights-of-way and two percent of the route is within the substation areas;

- Impacts to residences are minimized. There are 25 and 26 residences within 300 feet of the route centerline for the Preferred and Alternate routes, respectively. The Preferred Route has 11 residences within 100-200 feet of the route centerline compared to 14 residences within 100-200 feet of the route centerline for the Alternate Route.

- Environmental impacts are minimized at the Salem Creek crossing for the Preferred Route. The distance across the Salem Creek river valley is about 0.5 miles shorter than the Alternate Route. The Preferred Route follows a road right-of-way through the Salem Creek Valley and therefore affects fewer trees, which reduces fragmentation of the riverine forest. The Alternate Route does not follow an existing corridor through the Salem Creek Valley and would require clearing of a new corridor through the forested valley.

- The Preferred Route and Alternate Route are shorter than other alternatives identified in Figure 4, so they minimize impacts and costs.

- The Preferred Route is farther away from the existing Prairie Island – Byron – Pleasant Valley 345 kV transmission line, thereby improving overall system reliability in the area. If the 345 kV line and the proposed transmission line are located close to each other, the risk of losing both circuits due to a single catastrophic event is greater. To minimize the risk of a coincident outage, the distance between the Preferred Route and the existing Prairie Island – Byron – Pleasant Valley 345 kV transmission line was maximized between the Pleasant Valley and Bryon substations.

4.7 Rejected Route Alternatives

In selecting the Preferred Route proposed in this Application, Xcel Energy analyzed eight alternative routes between the Pleasant Valley and Byron substations. See Figure 4. In performing the route analysis, Xcel Energy considered social, environmental and engineering-related factors, such as proximity to residential or commercial structures, effects on trees, length of river valley crossings, proximity to areas of archaeological or historical significance, proximity to wetlands or PWI watercourses and several engineering design related factors.

Xcel Energy's rejection of these route alternatives was based on the following key factors:

- For the Preferred Route, an alternative route between the Dodge Mower County Road and CSAH 6 would require attaining easement for an 80-foot corridor through private land. Many residences in this area are located up to 0.5 miles away from paved county roads. Therefore, this cross-country route would be closer to residences than if it were located along County Road V and CSAH 15. This route also adds up to 1.5 miles to the length of the Project, thereby increasing costs.

- For the Preferred Route, alternative routes using County Roads 8 and 34 follow road rights-of-way. These roads, however, are in an area west of the City of Byron where residents are more densely clustered in close proximity to the roads. These alternative route centerlines would be located within 40 feet of residences.

- For the Alternate Route, an alternative route between CSAH 15 and CSAH 30 would affect more residences.

- For the Alternate Route, an alternative route would follow along County Road 149 through the Salem Creek river valley. See Appendix A, Figure A-3. This alternative route would add up to one mile to the total length of the Project, thereby increasing costs. In addition, more trees would have to be removed, which would increase forest fragmentation and potentially affect the wildlife that use the river corridor. There is the potential for remnant pre-settlement vegetative communities in this area, with increased potential for damaging rare or unique resources. In addition, there is a higher potential for cultural and historical sites in this area.

- Other alternative routes included using the southwest segment, the connector segment and the northeast segment; or using the southeast segment, the connector segment and the northwest segment. These alternative routes add 1.7 to 2.3 miles to the length of the route, thereby increasing the cost of the Project.

In each case, the proposed Preferred and Alternate routes had fewer impacts than the other alternatives.

4.8 Design Options to Accommodate Future Expansion

The transmission line is designed to meet current and projected needs. In addition, both the Pleasant Valley Substation and Byron Substation were designed and constructed to accommodate future transmission line interconnections.

5.0 Engineering Design, Construction and Right-of-Way Acquisition

5.1 Transmission Structures and Right-of-Way Design

5.1.1 Transmission Structures

The 161 kV transmission line is proposed to be constructed as a single circuit line using single-pole, weathering steel structures with brace post insulators. The height of the single circuit structures will range from 70 to 90 feet. The spans between structures will range from 400 to 650 feet with a right-of-way width of 80 feet. Table 8 summarizes the structure designs and foundation for the line.

Table 8: Structure Design Summary

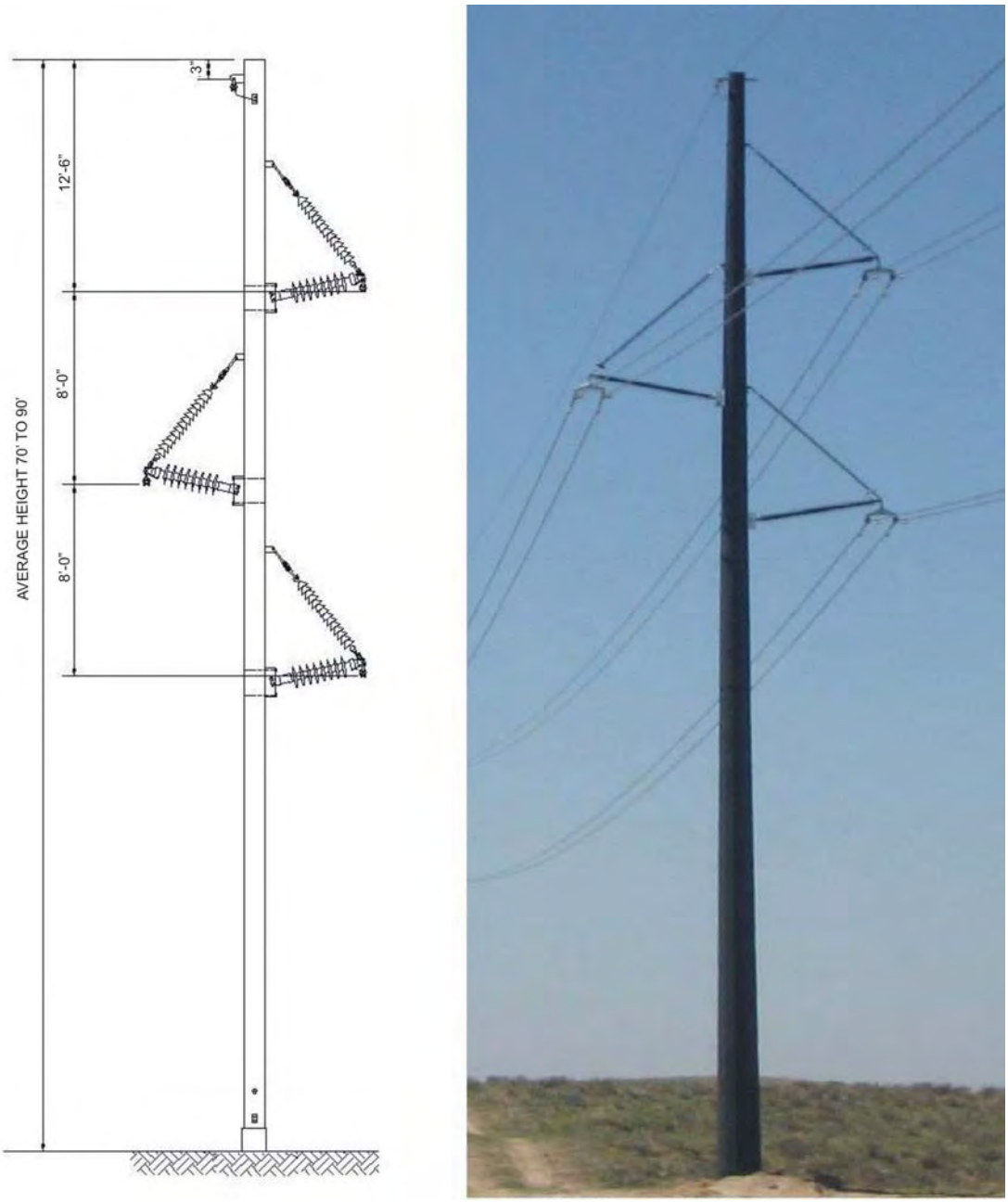
Line Type	Structure Type	Structure Material	ROW Width (feet)	Structure Height (feet)	Structure Base Diameter (inches)	Foundation Diameter (feet)	Span Between Structures (feet)	Pole to Pole Span on Single H-Frame Structure (feet)
Single Circuit 161 kV	Single Circuit Brace Post	Weathering Steel	80	70-90	24-42 (tangent structures) 36-72 (angle structures)	5-8	400-650	N/A

The transmission line would be constructed with a single 795 kcmil 26/7 Aluminum Core Steel Supported ("ACSS") conductor per phase.

Figure 5 below depicts a typical 161 kV single-circuit, single-pole, weathering steel structure with brace post insulators. Note that Figure 5 shows two conductors per phase, while this Project will use only one conductor per phase.

The proposed transmission line and modifications to the Pleasant Valley and Byron substations will be designed to meet or surpass all relevant local and state codes, the

Figure 5: Typical 161 kV Single-Circuit, Single-Pole, Weathering Steel, Brace Post Insulators



National Electric Safety Code ("NESC"), NERC requirements and Xcel Energy's own standards. Appropriate standards will be met for construction and installation and all applicable safety procedures will be followed during and after installation.

5.2 Right-of-Way Requirements

The transmission line will require an 80-foot right-of-way. See Figure 6. When the transmission line is placed cross-country across private land, an easement for the entire right-of-way (80 feet in width) will be acquired from the affected landowner(s). Xcel Energy will locate the poles as close to property division lines as reasonably possible. Figure 6 shows the right-of-way requirements for the proposed structures.

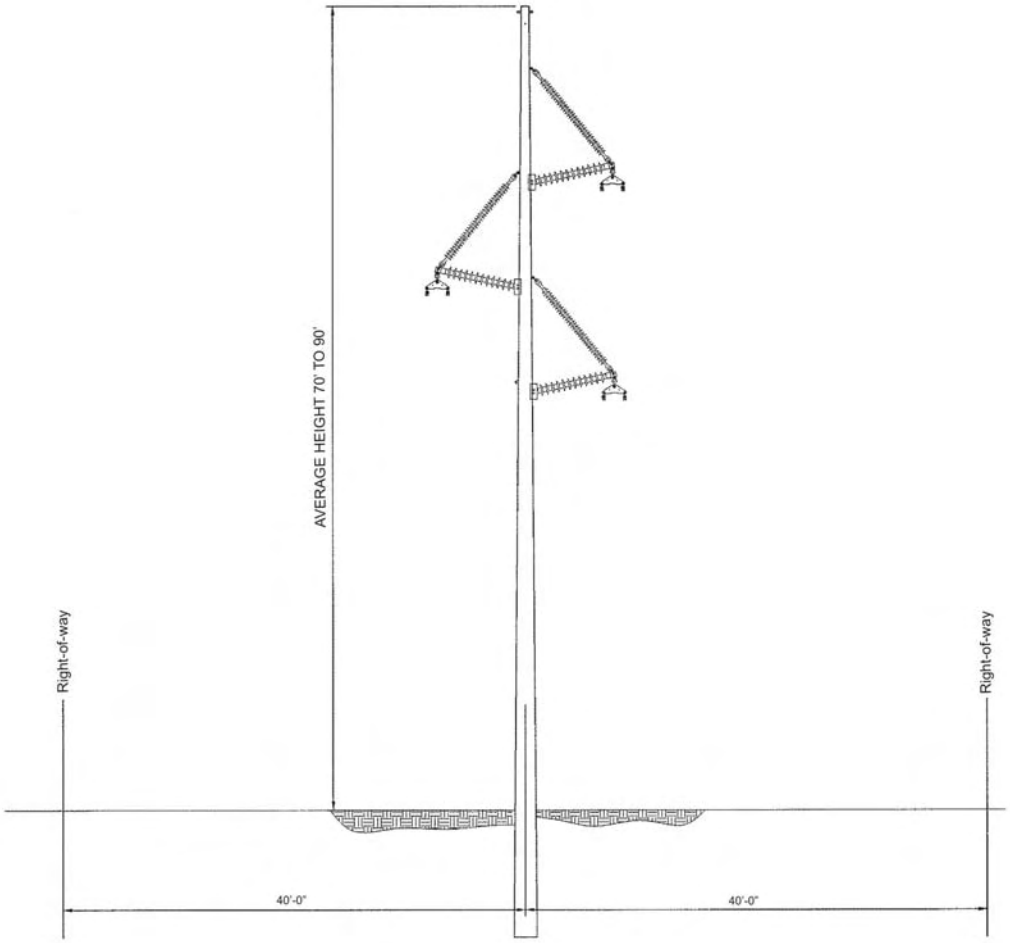
When the transmission line parallels other existing infrastructure right-of-way (e.g., roads, railroads, other utilities), an easement of lesser width may be required as parts of the right-of-way of the existing infrastructure can often be combined with the right-of-way needed for the transmission line. When paralleling existing right-of-way, Xcel Energy's typical practice is to place poles on adjacent private property, a few feet away from the existing right-of-way. With this pole placement, the transmission line shares the existing right-of-way, thereby reducing the size of the easement required from the private landowner.

5.2.1 Right-of-Way Evaluation and Acquisition

Transmission Lines

For transmission lines, utilities typically acquire easement rights across the parcels to accommodate the facilities, including both transmission lines and poles. The right-of-way acquisition process begins early in the detailed design process. The evaluation and acquisition process includes examining titles, contacting owners, surveying, preparing documents and purchasing the right-of-way. Each of these activities, particularly as it applies to easements for transmission line facilities, is described in more detail below.

Figure 6: Right-of-Way Requirements



161kV Line Typical Structure
80' Typical Total Right-of-Way

The first step in the right-of-way process is to identify all persons and entities that may have a legal interest in the real estate upon which the facilities will be built. To compile this list, a right-of-way agent or other persons engaged by Xcel Energy will complete a public records search of all land involved in the Project. A title report is then developed for each parcel to determine the legal description of the property and the owner(s) of record and to gather information about easements, liens, restrictions, encumbrances and other conditions of record.

The next step in the acquisition process is to evaluate the specific parcel. After owners are known, and typically after a route permit is issued for a project, a right-of-way representative personally contacts each property owner or the property owner's representative. The right-of-way agent describes the need for the transmission facilities and how the specific project may affect each parcel. The right-of-way agent also seeks information from the landowner about any specific construction concerns.

The right-of-way agent may also request the owner's permission for survey crews to enter the property and conduct preliminary survey work. The agent may also request permission to take soil borings to assess soil conditions and determine appropriate foundation design. Surveys are conducted to locate the right-of-way corridors, natural features, man-made features and associated elevations for use during the detailed engineering of the line. The soil analysis is performed by an experienced geotechnical testing laboratory.

During the evaluation process, the location of the proposed transmission line will be staked. This means that the survey crew locates each structure or pole on the ground and places a surveyor's stake to mark the location of the structure. The right-of-way agent can then show the landowner exactly where the structure(s) will be located on the property. The right-of-way agent also delineates the boundaries of the easement area required for safe operation of the transmission line.

The right-of-way agent then negotiates with the property owner(s) to determine the amount of just compensation for the rights to build, operate and maintain the transmission facilities within the easement area and to have reasonable access to the easement area. The agent will also provide maps of the transmission line route or site

and maps showing the landowner's parcel and will offer to compensate the landowner for the transmission line easement.

In the event that a complicated appraisal problem should arise, an appraisal is completed by the utility's representative(s) to determine the value of the land rights being acquired. The landowner is allowed a reasonable amount of time in which to consider the offer and to present any material that the owner believes is relevant to determining the property's value.

In nearly all cases, utilities are able to work with the landowners to address their concerns, and an agreement is reached for the utility's purchase of land rights. The right-of-way agent prepares all of the documents required to complete each transaction. Some of the documents that may be required include easement, purchase agreement or contract and deed.

In rare instances, a negotiated settlement cannot be reached and the landowner chooses to have an independent third party determine the value of the rights taken. Such valuation is made through the utility's exercise of the right of eminent domain pursuant to Minn. Stat. Chapter 117. The process of exercising the right of eminent domain is called condemnation.

In the event of a condemnation, the utility will provide the landowner with a copy of each appraisal it has obtained for the land or property rights. To start the condemnation process, a utility files a Petition in the district court where the property is located and serves that Petition on all owners of the property. If the court approves the Petition, the court then appoints a three-person condemnation "commission." The three people must understand applicable real estate issues. Once appointed, the commissioners schedule a viewing of the substation location or property over and across which the transmission line easement is to be located. Next, the commission schedules a valuation hearing where the utility and landowners can testify as to the fair market value of the easement or fee. The commission then makes an award as to the value of the property acquired and files it with the court. The commission also has the authority to award up to $3,000 in appraisal fees. Minn. Stat. § 117.189. Each party has 40 days from the filing of the award to appeal to the district court for a jury trial. In the event of an appeal, the jury hears land value evidence and renders a

verdict. At any point in this process, the case can be dismissed if the parties reach a settlement.

Once right-of-way is acquired and prior to construction, the right-of-way agent will again contact the owner of each parcel to discuss the construction schedule and construction requirements. To ensure safe construction of the line, special consideration may be needed for fences, crops or livestock. For instance, fences may need to be moved or temporary or permanent gates may need to be installed; crops may need to be harvested early; and livestock may need to be moved. In each case the right-of-way agent coordinates these actions with the landowner.

5.3 Transmission Line Construction, Restoration and Maintenance

5.3.1 Construction Procedures

Construction will begin after federal, state and local approvals are obtained, property and rights-of-way are acquired, soil conditions are established and final design is completed. The precise timing of construction will take into account various requirements that may be in place due to permit conditions, system loading issues and available workforce.

The actual construction will follow standard construction and mitigation practices that were developed from experience with past projects. These BMPs address right-of-way clearance, staging, erecting transmission line structures and stringing transmission lines. Construction and mitigation practices to minimize impacts will be developed based on the proposed schedule for activities, permit requirements, prohibitions, maintenance guidelines, inspection procedures, terrain and other practices. In some cases these activities, such as schedules, are modified to minimize impacts to sensitive environments.

Transmission line structures are generally designed for installation at existing grades. Typically, structure sites with 10 percent or less slope will not be graded or leveled. Sites with more than 10 percent slope will have working areas graded level or fill brought in for working pads. If the landowner permits, it is preferred to leave the leveled areas and working pads in place for use in future maintenance activities, if any.

If permission is not obtained, the site is graded back to its original condition as much as possible and all imported fill is removed from the site.

Typical construction equipment used on a Project consists of tree removal equipment, mowers, cranes, backhoes, digger-derrick line trucks, track-mounted drill rigs, dump trucks, front end loaders, bucket trucks, bulldozers, flatbed tractor-trailers, flatbed trucks, pickup trucks, concrete trucks and various trailers. Many types of excavation equipment are set on wheel or track-driven vehicles. Poles are transported on tractor-trailers. Staging areas are usually established for the Project. Staging involves delivering the equipment and materials necessary to construct the new transmission line facilities. The materials are stored at staging areas until they are needed for the Project.

Temporary lay down areas may be required for additional space for storage during construction. These areas will be selected for their location, access, security and ability to efficiently and safely warehouse supplies. The areas are chosen to minimize excavation and grading. The temporary lay down areas outside of the transmission line right-of-way will be obtained from affected landowners through rental agreements.

Access to the transmission line right-of-way corridor is made directly from existing roads or trails that run parallel or perpendicular to the transmission line right-of-way. In some situations, private field roads or trails are used. Permission from the property owner is obtained prior to accessing the transmission line corridor. Where necessary to accommodate the heavy equipment used in construction, including cranes, cement trucks and hole drilling equipment, existing access roads may be upgraded or new roads may be constructed. New access roads may also be constructed when no current access is available or the existing access is inadequate to cross roadway ditches.

When it is time to install the poles, they are generally moved from the staging areas and delivered to the staked location. The structures are typically placed within the right-of-way until the structure is set. Insulators and other hardware are attached while the pole is on the ground. The pole is then lifted, placed and secured using a crane.

Structures that are considered medium angle, heavy angle or deadened structures will have concrete foundations. In those cases, holes are drilled in preparation for the concrete. Drilled pier foundations may vary from 5 to 7 feet in diameter and 12 or more feet in depth, depending on soil conditions. After the concrete foundation is set, the pole is bolted to the foundation. Concrete trucks are required to bring the concrete in from a local concrete batch plant. Tangent and light angle structures may be placed on poured concrete foundations or direct embedded. Direct embedding involves digging a hole for each pole, filling it partially with crushed rock and then setting the pole on top of the rock base. The area around the pole is then backfilled with crushed rock and/or soil.

Environmentally sensitive and wetland areas may also require special construction techniques in some circumstances. During construction, the most effective way to minimize impacts to wet areas will be to span all wetlands, streams and rivers. In addition, Xcel Energy will not allow construction equipment to be driven across waterways except under special circumstances and only after discussion with the appropriate resource agency. Where waterways must be crossed to pull in the new conductors and shield wires, workers may walk across, use boats, or drive equipment across ice in the winter. These construction practices help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from waterways. Additional mitigative measures relating to wetlands are contained in Section 6.4.4.

5.3.2 Restoration Procedures

During construction, crews will attempt to limit ground disturbance wherever possible. However, areas are disturbed during the normal course of work, which can take several weeks in any one location. As construction on each parcel is completed, disturbed areas are restored to their original condition to the maximum extent practicable. The right-of-way agent contacts each property owner after construction is completed to see if any damage has occurred as a result of the project. If damage has occurred to crops, fences or the property, Xcel Energy will fairly reimburse the landowner for the damages sustained. In some cases, Xcel Energy may engage an outside contractor to restore the damaged property as nearly as possible to its original condition. Portions of vegetation that are disturbed or removed during construction of transmission lines will naturally reestablish to pre-disturbance conditions. Resilient

species of common grasses and shrubs typically reestablish with few problems after disturbance. Areas with significant soil compaction and disturbance from construction activities along the proposed transmission line corridor will require assistance in reestablishing the vegetation stratum and controlling soil erosion. Commonly used methods to control soil erosion and assist in reestablishing vegetation include, but are not limited to:

- Prompt re-seeding
- Erosion control blankets
- Silt fences
- Minimizing soil disturbance during construction

These erosion control and vegetation establishment practices are regularly used in construction projects and are referenced in the construction permit plans. Long-term impacts are minimized by using these construction techniques.

5.3.3 Maintenance Procedures

Transmission lines and substations are designed to operate for decades and require only moderate maintenance, particularly in the first few years of operation.

The estimated service life of a transmission line for accounting purposes is approximately 40 years. However, practically speaking, transmission lines are seldom completely retired. Transmission infrastructure has very few mechanical elements and is built to withstand weather extremes that are normally encountered. With the exception of severe weather such as tornadoes and heavy ice storms, transmission lines rarely fail. Transmission lines are automatically taken out of service by the operation of protective relaying equipment when a fault is sensed on the system. Such interruptions are usually only momentary. Scheduled maintenance outages are also infrequent. As a result, the average annual availability of transmission infrastructure exceeds 90 percent.

The principal operating and maintenance cost for transmission facilities is the cost of inspections, usually done monthly by air. Annual operating and maintenance costs for transmission lines in Minnesota and the surrounding states vary. For transmission lines with voltages ranging from 69 kV through 345 kV, experience shows that the maintenance cost is approximately $300 to $500 per mile. Actual line-specific maintenance costs depend on the setting, the amount of vegetation management necessary, storm damage occurrences, structure types, materials used and the age of the line.

Substations require a certain amount of maintenance to keep them functioning in accordance with accepted operating parameters and the NESC and NERC requirements. Transformers, circuit breakers, batteries, protective relays and other equipment need to be serviced periodically in accordance with the manufacturer's recommendation. The site itself must be kept free of vegetation and drainage maintained.

5.4 Electric and Magnetic Fields and Stray Voltage

The term electromagnetic fields ("EMF") refer to electric and magnetic fields that are coupled together such as in high frequency radiating fields. For the lower frequencies associated with power lines, EMF should be separated into electric and magnetic fields, which arise from the flow of electricity and the voltage of a line and are measured in kilovolts per meter ("kV/m") and milliGauss ("mG"), respectively. The intensity of the electric field is proportional to the voltage of the line, and the intensity of the magnetic field is proportional to the current flow through the conductors. Transmission lines operate at a power frequency of 60 hertz (cycles per second).

There is no federal standard for transmission line electric fields. The Commission, however, has imposed a maximum electric field limit of 8 kV/m measured at one meter above the ground. See *In the Matter of the Petitions of Northern States Power Company d/b/a Xcel Energy and Dairyland Cooperative for Permits to Construct a 69 kV Transmission Line from Taylors Falls to Chisago County Substation*, Docket No. E-002/TL-06-1677, Environmental Assessment, at p. 45 (August 20, 2007). The standard was designed to prevent serious hazards from shocks when touching large objects parked under AC

transmission lines of 500 kV or greater. The maximum electric field, measured at one meter above ground, associated with this proposal is calculated to be 1.46 kV/m.

Considerable research has been conducted throughout the past three decades to determine whether exposure to power-frequency (60 hertz) magnetic fields causes biological responses and health effects. Epidemiological and toxicological studies have shown no statistically significant association or weak associations between EMF exposure and health risks. Public health professionals have also investigated the possible impact of exposure to EMF upon human health. While the general consensus is that electric fields pose no risk to humans, the question of whether exposure to magnetic fields can cause biological responses or health effects continues to be debated.

The National Institute of Environmental Health Sciences ("NIEHS") issued its final report on "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields" in 1999, in response to the Energy Policy Act of 1992. The NIEHS concluded that the scientific evidence linking EMF exposures with health risks is weak and that this finding does not warrant aggressive regulatory concern. However, because of the weak scientific evidence that supports some association between EMF and health effects and the common exposure to electricity in the United States, passive regulatory action, such as providing public education on reducing exposures, is warranted.

In 2007, the World Health Organization ("WHO") concluded a review of the health implications of electromagnetic fields. In this report, the WHO stated:

> Uncertainties in the hazard assessment [of epidemiological studies] include the role that control selection bias and exposure misclassification might have on the observed relationship between magnetic fields and childhood leukemia. In addition, virtually all of the laboratory evidence and the mechanistic evidence fail to support a relationship between extremely low frequency ("ELF") magnetic fields and changes in biological function or disease status. Thus, on balance, the evidence is not strong enough to be considered causal, but

> sufficiently strong to remain a concern. (*Environmental Health Criteria Volume N°238 on Extremely Low Frequency Fields* at p. 12, WHO (2007)).

Also, regarding disease outcomes, aside from childhood leukemia, the WHO stated that:

> A number of other diseases have been investigated for possible association with ELF magnetic field exposure. These include cancers in both children and adults, depression, suicide, reproductive dysfunction, developmental disorders, immunological modifications and neurological disease. The scientific evidence supporting a linkage between ELF magnetic fields and any of these diseases is much weaker than for childhood leukemia and in some cases (for example, for cardiovascular disease or breast cancer) the evidence is sufficient to give confidence that magnetic fields do not cause the disease. (*Id.* at p.12.)

Furthermore, in their "Summary and Recommendations for Further Study" WHO emphasized that:

> the limit values in [EMF] exposure guidelines [not] be reduced to some arbitrary level in the name of precaution. Such practice undermines the scientific foundation on which the limits are based and is likely to be an expensive and not necessarily effective way of providing protection. (*Id.* at p. 12).

WHO concluded that:

> given both the weakness of the evidence for a link between exposure to ELF magnetic fields and childhood leukemia, and the limited impact on public health if there is a link, the benefits of exposure reduction on health are unclear. Thus, the costs of precautionary measures should be very low. (*Id.* at p. 13).

Wisconsin, Minnesota and California have all conducted literature reviews or research to examine this issue. In 2002, Minnesota formed an Interagency Working Group ("Working Group") to evaluate the body of research and develop policy recommendations to protect the public health from any potential problems resulting

from HVTL EMF effects. The Working Group consisted of staff from various state agencies and published its findings in a White Paper on EMF Policy and Mitigation Options in September 2002, (Minnesota Department of Health, 2002). The report summarized the findings of the Working Group as follows:

> Research on the health effects of EMF has been carried out since the 1970s. Epidemiological studies have mixed results – some have shown no statistically significant association between exposure to EMF and health effects, some have shown a weak association. More recently, laboratory studies have failed to show such an association, or to establish a biological mechanism for how magnetic fields may cause cancer. A number of scientific panels convened by national and international health agencies and the United States Congress have reviewed the research carried out to date. Most researchers concluded that there is insufficient evidence to prove an association between EMF and health effects; however, many of them also concluded that there is insufficient evidence to prove that EMF exposure is safe. (*Id.* at p. 1.)

Based on the Working Group and WHO findings, the Commission has repeatedly found that "there is insufficient evidence to demonstrate a causal relationship between EMF exposure and any adverse human health effects." See *In the Matter of the Application of Xcel Energy for a Route Permit for the Lake Yankton to Marshall Transmission Line Project in Lyon County*, Docket No. E-002/TL-07-1407, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Xcel Energy for the Lake Yankton to Marshall Transmission Project at p. 7-8 (August 29, 2008); *In the Matter of the Application for a HVTL Route Permit for the Tower Transmission Line Project*, Docket No. ET-2, ET015/TL-06-1624, Findings of Fact, Conclusions of Law and Order Issuing a Route Permit to Minnesota Power and Great River Energy for the Tower Transmission Line Project and Associated Facilities at p. 23 (August 1, 2007).

The OES has also analyzed the potential impacts of EMF on human health and safety and concluded that there is insufficient evidence to show a link between EMF and health effects:

> A number of national and international health agencies (Minnesota Department of Health, WHO, NIEHS) have generally concluded in their research that there is insufficient evidence to prove a connection between EMF exposure and health effects. Research has not been able to establish a cause and effect relationship between exposure to magnetic fields and human disease, nor a plausible biological mechanism by which exposure to EMF could cause disease.

In the Matter of the Application for a Route Permit for the Yankee Substation to Brookings County Substation 69 kV High Voltage Transmission Line Project, Docket No. E002/TL-07-1626, Environmental Assessment at p. 10 (May 30, 2008).

The Public Service Commission of Wisconsin ("PSCW") has periodically reviewed the science on EMF since 1989 and has held hearings to consider the topic of EMF and human health effects. The most recent hearings on EMF were held in July 1998. In January 2008, the PSCW published a fact sheet regarding EMF. In this fact sheet the PSCW noted that:

> Many scientists believe the potential for health risks for exposure to EMF is very small. This is supported, in part, by weak epidemiological evidence and the lack of a plausible biological mechanism that explains how exposure to EMF could cause disease. The magnetic fields produced by electricity are weak and do not have enough energy to break chemical bonds or to cause mutations in DNA. Without a mechanism, scientists have no idea what kind of exposure, if any, might be harmful. In addition, whole animal studies investigating long-term exposure to power frequency EMF have shown no connection between exposure and cancer of any kind. (*EMF-Electric & Magnetic Fields*, PSC (January 2008)).

There are presently no Minnesota regulations pertaining to EMF exposure. Xcel Energy provides information to the public, interested customers and employees so they can make informed decisions about EMF. Such information includes measurements for customers and employees upon their request.

5.4.1 Electric Fields

The electric field from a transmission line can couple with a conductive object, such as a vehicle or a metal fence, which is in close proximity to the line. The HVTLs can induce a voltage on objects, and therefore make it possible for current to flow as the object is discharged. The voltage buildup is dependent on many factors, including the weather condition, object shape, object size, object orientation, object to ground resistance, object capacitance and location along the right-of-way. If these objects are insulated or semi-insulated from the ground and a person touches them, a small current would pass through the person's body to the ground. This might be accompanied by a spark discharge and mild shock, similar to what can occur when a person walks across a carpet and touches a grounded object or another person.

The main concern with induced voltage on an object is the discharge through the person to ground if a person were to touch the object. The best method to avoid these discharges is not to park equipment directly under the transmission line. Another option would be to drop a chain that is attached to the equipment onto the ground (or lower the head to the ground on a combine) prior to dismounting if parked in the area of the transmission line and pulling the chain (or head) up after getting into the equipment. It is important to note that use of a chain attached to farm machinery to eliminate spark discharges is not necessary for safety reasons and therefore should only be considered if the discharge is considered annoying to the operator and the vehicle must be parked under the transmission line.

To ensure that any discharge does not reach unsafe levels, the NESC requires that any discharge be less than 5 milliamperes ("mA"). Based on Xcel Energy's 161 kV transmission line operating experience, the discharge from any large mobile object—such as a bus, truck, or farm machinery—parked under or adjacent to the transmission line would be unlikely to reach levels considered to be an annoyance and would be less than the 5 mA NESC limit. Xcel Energy would also assure that any fixed object, such as a fence or other large permanent conductive object in close proximity to or parallel to the transmission line, would be grounded such that any discharge would be less than the 5 mA NESC limit.

The intensity of electric fields is associated with the voltage of the line and is measured in kV/m. Electric fields of transmission lines above ground are designated by the difference in voltage between two points (usually one meter). Table 9 provides the calculated electric fields at maximum operating voltage for the proposed transmission line. Maximum operating voltage is defined as 105 percent of the nominal voltage.

Table 9: Calculated Electric Fields (kV/m) for Proposed Transmission Line Design (1 meter above ground)

Structure Type	Maximum Operating Voltage (kV)	Distance to Proposed Centerline									
		-300'	-200'	-100'	-50'	-25'	0'	25'	50'	100'	200'	300'
Braced Post 161kV Steel Pole Single Circuit	169	0.01	0.02	0.09	0.39	0.85	1.46	1.02	0.33	0.10	0.02	0.01

The maximum calculated electric field (1.46 kV/m) is less than 20 percent of the maximum limit of 8 kV/m that has been a permit condition imposed by the Commission in other HVTL routing proceedings. The Commission's standard was designed to prevent serious hazard from shocks when touching large objects, such as tractors, parked under HVTLs of 500 kV or greater.

Other potential impacts of electric fields include interference with the operation of pacemakers and implantable cardioverters/defibrillators. Interference with implanted cardiac devices can occur if the electric field intensity is high enough to induce sufficient body currents to cause interaction.

Modern bipolar devices are much less susceptible to interactions with electric fields. Medtronic and Guidant, manufacturers of pacemakers and implantable cardioverters/defibrillators, have indicated that electric fields below 6 kV/m are unlikely to cause interactions affecting operation of most of their devices.

Older unipolar designs are more susceptible to interference from electric fields. Research completed by Toivoen et al. (1991) indicated that the earliest evidence of

interference was in electric fields ranging from 1.2 kV/m to 1.7 kV/m. For older style unipolar designs, the electric field for some proposed structure types do exceed levels that Toivoen et al. has indicated may produce interference. However, a recent paper (Scholten et al., 2005) concludes that the risk of interference inhibition of unipolar cardiac pacemakers from high voltage power lines in everyday life is small. In the unlikely event that a pacemaker is affected, the effect is typically a temporary asynchronous pacing (commonly referred to as reversion mode or fixed rate pacing). The pacemaker would return to its normal operation when the person moves away from the source of the interference.

5.4.2 Magnetic Fields

The magnetic field profiles around the proposed HVTLs for each structure and conductor configuration being considered for the Project is shown in Table 10. Magnetic fields were calculated for each section of the project under two system conditions: the expected peak and average current flows as projected for the year 2011, under normal system intact conditions. The magnetic field profile data show that magnetic field levels decrease rapidly as the distance from the centerline increases (proportional to the inverse square of the distance from source).

Because the magnetic field produced by the transmission line is dependent on the current flowing on its conductors, the actual magnetic field when the Project is placed in service is typically less than that shown in the charts. This is because the charts represent the magnetic field with current flow expected normal peak. Actual current flow on the line will vary as magnetic field changes throughout the day and will be less than peak levels during most hours of the year.

As load growth occurs, the current flow on the line will increase, and because the magnetic field is directly related to current flow, the magnetic field will also increase.

Table 10 provides a summary of the magnetic field calculations associated with the Project. These calculations are based on the summer peak current and average flow projected for the year 2011 under normal system conditions (system intact). The peak magnetic field values are calculated at a point directly under the transmission line and

where the conductor is closest to the ground. The same method is used to calculate the magnetic field at the edge of the right-of-way.

Table 10: Calculated Magnetic Flux Density (mG) for Proposed Transmission Line Design (1 meter above ground)

Segment	System Condition	Current (Amps)	Distance to Proposed Centerline										
			-300'	-200'	-100'	-50'	-25'	0'	25'	50'	100'	200'	300'
Single Circuit 161kV Line	Peak	402	0.44	1.02	3.93	12.69	28.64	53.43	33.95	14.82	4.54	1.22	0.56
	Average	241	0.27	0.61	2.36	7.61	17.17	32.03	20.35	8.88	2.72	0.73	0.34

5.4.3 Stray Voltage

"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors.
Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line. Appropriate measures will be taken to address potential stray voltage issues on a case by case basis.

5.5 Farming Operations

Farm equipment, passenger vehicles and trucks may be safely used under and near power lines. The power lines will be designed to meet or exceed minimum clearance requirements over roads, driveways, cultivated fields and grazing lands specified by the NESC. Recommended clearances within the NESC are designed to accommodate a relative vehicle height of 14 feet.

There is a potential for vehicles under HVTLs to build up an electric charge. If this occurs, the vehicle can be grounded by attaching a grounding strap to the vehicle long enough to touch the earth. Such buildup is a rare event because generally vehicles are

effectively grounded through tires. Modern tires provide an electrical path to ground because carbon black, a good conductor of electricity, is added when they are produced. Metal parts of farming equipment are frequently in contact with the ground when plowing or engaging in various other activities. Therefore, vehicles will not normally build up a charge unless they have unusually old tires or are parked on dry rock, plastic or other surfaces that insulate them from the ground.

Buildings are permitted near transmission lines but are generally prohibited within the right-of-way itself because a structure under a line may interfere with safe operation of the transmission facilities. For example, a fire in a building on the right-of-way could damage a transmission line. As a result, NESC guidelines establish clear zones for transmission facilities. Metal buildings may have unique issues. For example, metal buildings near power lines of 200 kV or greater must be properly grounded. Any person with questions about a new or existing metal structure can contact Xcel Energy for further information about proper grounding requirements.

6.0 Land Use, Recreation, and Historic and Natural Resources

6.1 Environmental Setting

The 67-square mile Project Area lies along a natural boundary that has approximately equal amounts of rainfall and evapotranspiration, which marks the transition between grasslands to the west and forest to the east. See Figures 1 and 2. This transition area is characterized by two MnDNR Ecological Classification subsections: the relatively drier Oak Savanna subsection and the Rochester Plateau subsection.

The Pleasant Valley Substation is located in an agricultural area in rural Mower County. The Byron Substation is located within the City of Byron in Olmstead County. The remaining portions of the routes cross primarily rural, agricultural areas. See Appendix D, Figure D-1.

6.1.1 Topography

Unlike the rest of Minnesota, the Project Area was not covered by the most recent glaciation. However, melt waters from the receding glaciers shaped the landscape and formed many of the river drainage systems in the area. The drainage network is well developed, with many small streams. There are no natural lakes in the area. Prior to settlement, the landscape was dominated by wetlands. In order to facilitate and promote farming, the area was extensively drained during the first half of the 20th century.

6.1.2 Geology and Soils

The geology is composed of a gently rolling landscape with thick loess deposits and few bedrock outcrops. Soils throughout the area consist of loams, silt loams and silty clay loams. The area has varying thicknesses of loess (wind-blown silt) with more areas of exposed bedrock found in the eastern portion of the Project Area. Loess deposits overlie Orvidovician-age dolomites, limestones and sandstones.

In the Zumbro River watershed, the topography is more subdued, and the loess is thicker with little exposed bedrock. Some of the areas along the South Fork Zumbro

River and the North Branch Root River are formed from the dissolution of soluble rocks such as limestone (karst topography). Sinkholes, which may occur in these areas, can form passageways that funnel the water from the surface into the groundwater system. Aquifers in this type of topography are susceptible to contamination.

6.2 Human Settlement

6.2.1 Public Health and Safety

Proper safeguards will be implemented for construction and operation of the facility. The Project will be designed in compliance with local, state, NESC and Xcel Energy standards for clearance to ground, crossing utilities and buildings, strength of materials, and right-of-way widths. Construction and contract crews will comply with local, state, NESC and Xcel Energy standards for installation of facilities and standard construction practices. Established Xcel Energy and industry safety procedures will also be followed after the transmission line is installed. This will include clear signage during all construction activities.

The proposed transmission lines will be equipped with protective devices (circuit breakers and relays located in the substation where the transmission lines terminate) to safeguard the public if an accident occurs, such as a structure or conductor falling to the ground. The protective equipment will de-energize the transmission line should such an event occur. In addition, the substation facilities will be fenced and access limited to authorized personnel. Proper signage will be posted to warn the public about the risk of coming into contact with the energized equipment.

6.2.2 Commercial, Industrial and Residential Land Use

The majority of the Project Area is zoned as Rural or Agricultural. Although the PPSA generally preempts local land use control, local zoning plans will be accommodated as much as possible during detailed routing (Minn. Stat. Ch. 216E). Applicable zoning ordinances in the Project Area may include zoning ordinances implemented by Olmsted County, Dodge County, Mower County, City of Byron and the Township Cooperative Planning Association.

The Preferred Route is located in Mower, Olmsted and Dodge counties, with approximately 75 percent of the route located in Dodge County. See Figure 3. The portion of the route in Mower County is zoned as Rural Management, in Dodge County as Agricultural District and in Olmsted County as an Agricultural Protection District. Within the City of Byron, the land is zoned as Industrial.

The Alternate Route is located in Mower and Olmsted Counties, with approximately 85 percent of the route located in Olmsted County. See Figure 3. The portion of the route in Mower County is zoned as Rural Management, in Dodge County as Agricultural District and in Olmsted County as an Agricultural Protection District. Within the City of Byron, the land is zoned as Industrial.

The Connector Segment is located in both Dodge and Olmsted Counties, with approximately 50 percent of the segment located in each county. See Figure 3. The portion of the segment in Dodge County is zoned as Agricultural District and in Olmsted County as an Agricultural Protection District.

Both the Preferred and Alternate routes include the substations located at the north and south ends of the proposed transmission line. See Figure 3. The Pleasant Valley Substation (owned by Great River Energy) is located in Pleasant Valley Township, Mower County, and the land is zoned as Rural Management. The Byron Substation (owned by Xcel Energy) is located in the City of Byron in an area zoned as Industrial.

Mitigative Measures

Land uses near the proposed routes are not expected to change as a result of the construction and operation of the proposed transmission lines. Permanent impacts will be limited to the area where poles are placed and to the construction areas as described in Section 6.2

For both routes and the Connector Segment, the structures will need to be placed in farm fields along existing roadways; however, impacts to agricultural operations will be minimized by following within or adjacent to existing roadway rights-of-way as much as possible. See Section 5.2 for more details.

6.2.3 Displacement

NESC and Xcel Energy standards require certain clearances between transmission line facilities and buildings for safe operation of the transmission line. Xcel Energy acquires a right-of-way for transmission lines that is sufficient to maintain these clearances. Displacement can occur when an existing structure is located within the right-of-way for a new transmission facility. The transmission line will be designed so that all existing residences are located outside of the right-of-way. The Project will not require displacement of occupied residences for either the Preferred or Alternate Routes.

No buildings on the Preferred Route, Alternate Route or the Connector Segment will need to be moved or replaced.

Mitigative Measures

It is not anticipated that any buildings will be displaced. Therefore, no mitigative measures are proposed.

6.2.4 Noise

Transmission conductors produce noise under certain conditions. The level of noise depends on conductor conditions, voltage level and weather conditions. Generally, activity-related noise levels during the operation and maintenance of substations and transmission lines are minimal.

Noise emissions from a transmission line occur during certain weather conditions. In foggy, damp, or rainy weather, power lines can create a crackling sound when a small amount of electricity ionizes the moist air near the wires. During heavy rain, the background noise level of the rain is usually greater than the noise from the transmission line. As a result, people do not normally hear noise from a transmission line during heavy rain. During light rain, dense fog, snow and other times when there is moisture in the air, transmission lines can produce noise. Noise levels produced by a transmission line are generally less than outdoor background levels and are therefore not usually audible. At substations, the source of noise is primarily the transformers,

which can create a humming noise. Table 11 shows noise levels associated with common, everyday activities.

Since human hearing is not equally sensitive to all frequencies of sound, the most noticeable frequencies of sound are given more "weight" in most measurement schemes. The A-weighted scale corresponds to the sensitivity range for human hearing. Noise levels capable of being heard by humans are measured in decibels ("dBA"). A noise level change of 3 dBA is barely perceptible to human hearing. A 5 dBA change in noise level, however, is clearly noticeable. A 10 dBA change in noise level is perceived as a doubling of noise loudness, while a 20 dBA change is considered a dramatic change in loudness.

Table 11: Common Noise Sources and Levels

Noise Source	Sound Pressure Level (dBA)
Whisper	20
Secluded Woods	30
Bedroom	40
Library	50
Conversational Speech	60
Business Office	70
Heavy Truck Traffic	80
Chainsaw	90
Jointer/Planer	100
Pneumatic Chipper	110
Rock and Roll Concert	120
Jet Aircraft (at 100 meters)	130
Jet Engine (at 25 meters)	140

Source: Environmental Impact Analysis Handbook, ed. by Rau and Wooten, 1980.

The noise standards established by the Minnesota Pollution Control Agency ("MPCA") "are consistent with speech, sleep, annoyance and conversation requirements for receivers based on the present knowledge for preservation of public health and welfare." Minn. Rules 7030.0040. Similar land uses have been grouped and classified using the State's Noise Area Classification ("NAC") system. Residential areas, churches and similar type land use activities are included in NAC 1; commercial-type land use activities are included in NAC 2; and industrial-type land use activities are included in NAC 3.

In Minnesota, statistical sound levels ("L" or Level Descriptors) are used to evaluate noise levels and identify noise impacts. The standards are expressed as a range of permissible dBA within a one hour period; L_{50} is the dBA that may be exceeded 50 percent of the time within an hour, while L_{10} may be exceeded 10 percent of the time within an hour. Table 12 identifies the established daytime and nighttime noise standards by NAC.

Table 12: Noise Standards by Noise Area Classification

Noise Area Classification	Daytime Noise Standard		Nighttime Noise Standard	
	L_{50} (dBA)	L_{10} (dBA)	L_{50} (dBA)	L_{10} (dBA)
1	60	65	50	55
2	65	70	65	70
3	75	80	75	80

The noise generated from the transmission lines is not expected to exceed background noise levels and would therefore not be audible at any receptor location. Transmission conductors and transformers at substations can produce noise when it is foggy, damp or rainy, including a subtle cracking or humming noise. Any audible noise will be well below the MPCA noise standards established for NAC 1, as shown in Tables 11 and 12 above.

The proposed transmission lines were modeled using the Bonneville Power Administration CFI8X model to evaluate audible noise from transmission lines. Where possible, the model was executed as a worst-case scenario benchmark, to ensure that noise was not under-predicted. Table 13 presents the L_5 and L_{50} noise levels predicted for proposed transmission line structures and voltages for the Project.

Table 13: Calculated Audible Noise (dBA) for Proposed Single Transmission Line Design (1 meter above ground)

Structure Type	L5 at edge of right-of-way (dBA)	L50 at edge of right-of-way (dBA)
Braced Post 161 kV, Steel Pole, Single Circuit	35.0	31.5

Audible noise levels for the transmission line are not predicted to exceed the MPCA Noise Limits outside the right-of-way for any Noise Area Classification. Therefore, no mitigation is required for the audible noise generated by the transmission lines. In addition, the substation transformers were modeled to predict the distance to the nighttime L50 allowable noise level of 50 dBA for NAC 1 receptors. The noise source levels for each substation were obtained from prospective vendors and compared to the National Electrical Manufacturers Association ("NEMA") Standards Publication Number TR 1-1993 X design noise standards. To conservatively predict future noise levels and the distance to the nighttime compliance limit of 50 dBA, the NEMA-recommended design noise levels for each transformer were treated as point sources at the substation boundary and propagated to the distance where the noise levels would be reduced to 50 dBA.

Mitigative Measures

Residences are located a minimum of 3,100 feet to the northwest of the Pleasant Valley Substation and 580 feet to the south of the Byron Substation. The substations will be designed to emit noise levels that will attenuate to levels lower than the MPCA noise limits at the nearest receptors.

Transmission line noise levels are not predicted to exceed the MPCA noise standards outside the right-of-way for all noise area classifications. Likewise, substation noise will not exceed applicable limits, including the MPCA noise limits. Therefore, no mitigation is required for the audible noise generated by the transmission lines or substations.

6.2.5 Television and Radio Interference

Corona from transmission line conductors can generate electromagnetic "noise" at the same frequencies that radio and television signals are transmitted. This noise can cause interference with the reception of these signals depending on the frequency and strength of the radio and television signal. Tightening loose hardware on the transmission line usually resolves the problem.

If radio interference from transmission line corona does occur, satisfactory reception from AM radio stations presently providing good reception can be obtained by appropriately modifying (or adding to) the receiving antenna system. Moreover, AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly within the right-of-way to either side.

FM radio receivers do not usually pick up interference from transmission lines because:

- Corona-generated radio frequency noise currents decrease in magnitude as the frequency increases and are quite small in the FM broadcast band (88-108 Megahertz).

- The excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude-type disturbances.

A two-way mobile radio located immediately adjacent to and behind a large metallic structure (such as a steel tower) may experience interference. Moving either mobile radio so that the metallic structure is not immediately between the two units should restore communications. This would generally require a movement of less than 50 feet by the mobile radio adjacent to the metallic tower.

Television interference is rare but may occur when a large transmission structure is aligned between the receiver and a weak distant signal, creating a shadow effect. Loose or damaged hardware may also cause television interference.

Digital reception is, in most cases, considerably more tolerant of electric interference and somewhat less resistant to multipath reflections. In the digital realm, the picture does not gradually degrade; rather, at what is called the "avalanche point," the picture suddenly pixelates (turns into squares) and usually "freezes."

If the interference is due to the power line, the electric utility will remedy problems so that reception is restored to its original quality. Generally, the problem is resolved by moving or raising or adjusting the customer's antenna. In some instances, a more effective antenna or a signal amplifier is required.

Mitigative Measures

No impacts are anticipated from either the Preferred or Alternate Routes. However, if radio or television interference occurs because of the transmission line, Xcel Energy will work with the affected parties to restore reception to pre-Project quality.

6.2.6 Aesthetics

The single-circuit brace post and double-circuit davit pole will be Core 10 (weathering-steel) pole structures. The single-circuit brace poles will be 70 to 90 feet in height and the double-circuit davit poles will be 90 to 110 feet in height. The span range for the poles will be 400 to 650 feet. Where the lines need to span longer distances, H-frame pole structures will be used in place of single pole structures. See Section 5.1 for diagrams of the transmission line structures.

Land use within the Project Area is primarily agricultural; however, residential, wind power project and industrial land uses are also present. There are existing transmission lines within the viewshed in the Project Area, including a 69 kV line owned by Peoples Cooperative, a 69 kV and 161 kV line owned by Southern Minnesota Municipal Power Agency, a 161 kV line owned by Great River Energy and a 345 kV line owned by Xcel Energy. See Figure 3.

Mitigative Measures

The transmission lines will be visible by some residents near the Project for the Preferred and Alternate routes and the Connector Segment. However, both routes maximize the use of existing corridors and avoid residences to the greatest extent practicable.

6.2.7 Cultural Values

Cultural values are the history and beliefs of the area that provide a framework for community unity. The economy of the Project Area primarily depends on agricultural practices (typically corn, soybeans and grazing), with some manufacturing and tourism. In general, according to comments at the public open house, many residents

value their rural or semi-rural lifestyle and the existing farming operations and agricultural history, and have high-standards for health and safety.

Mitigative Measures

Xcel Energy understands these concerns and are proposing routes and mitigation measures to reduce any impacts on the community.

6.2.8 Recreation

Recreational resources near the Preferred and Alternate routes include snowmobile trails and wildlife management areas. See Appendix D, Figure D-2 for locations and names of recreational resources. In addition, the rivers and tributaries within the vicinity of the Preferred and Alternate routes are used for recreational activities such as boating and fishing. The Project will not directly affect these resources, and the transmission line is not expected to be visible from these areas.

Mitigative Measures

Because the routes will not directly affect recreational areas, mitigative measures are not necessary.

6.2.9 Public Services

Public services in the Project Area include sewer and water services and existing and future transportation corridors and projects. In the City of Byron, water and sewer services are provided by city-owned wells and wastewater treatment facilities. Outside the city boundaries, water is obtained from wells, and wastewater is treated with individual septic treatment systems.

A proposed highway project includes an interchange on either State Highway 14 at 119th Avenue or at County Road 15 on the western edge of the City of Byron. The proposed transmission line will be constructed before the interchange construction, which is proposed for sometime in the next 10 to 20 years. The use of the proposed future corridor for this interchange was considered during the selection of the both the Preferred and Alternate routes.

Mitigative Measures

Because the routes will not directly affect public services, mitigative measures are not necessary.

6.3 Land Based Economics

6.3.1 Socioeconomic Impacts

Minority residents make up a relatively small percentage of the population in all three counties. A slightly higher percentage of persons with income levels below the federal poverty line live in Mower County than in either Olmstead or Dodge County. Population and economic data is provided in Table 14.

Per capita incomes within the Project Area range from $19,259 to $24,939. The Project Area does not contain disproportionately high minority or low-income populations. No impacts are anticipated to minority or low-income populations.

Table 14: Population and Economic Characteristics

Location	Population	Minority Population (percent)	Caucasian Population (percent)	Per Capita Income	Percentage of Population Below Poverty Level
State of Minnesota	4,919,479	11.8	89.4	$23,198	7.9
Olmsted County	124,277	11.0	90.3	$24,939	6.4
Mower County	38,603	7.0	94.7	$19,795	9.2
Dodge County	17,731	4.3	96.6	$19,259	5.8
City of Byron	3,500	2.6	97.8	$20,297	3.6

Source: 2000 U.S. Census: General Demographic Characteristics

Approximately 15 to 25 workers will be needed over 26 weeks to construct the proposed transmission line. The estimated labor cost for the line is $700,000. During construction, construction crews will spend money locally, thereby providing a small economic benefit to the community.

Once the Project is operational, its socioeconomic effects are generally positive because it will increase the local tax base in two ways. First, the proposed Project will

allow continued wind energy development in the Project Area. Second, in rural areas with relatively small tax bases, the incremental amount coming from transmission lines can be significant.

Mitigative Measures

Xcel Energy does not anticipate any adverse socioeconomic impacts. Therefore, no mitigative measures are proposed.

6.3.2 Agriculture

Nearly 90 percent of land in the Project Area is in agricultural production, according to the USDA 2002 Census of Agriculture. The primary crops in Dodge, Mower and Olmsted Counties are corn (43 percent; *Zea mays*) and soybeans (37 percent; *Glycine max*), with hay fields and pasture areas also scattered throughout the area. The primary livestock are cattle and hogs in Dodge and Olmsted Counties, and cattle, hogs and sheep in Mower County (USDA 2002). The total amount of land in farm production and the market value of agricultural products for the three counties is provided in Table 15.

Table 15: Agricultural Data

County	Total Acres in Production	Percentage of Possible Farm Acres in Production
Olmsted	219,914	81
Dodge	233, 375	92
Mower	371, 272	93

Federal regulations define prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber and oilseed crops and is available for these uses." (7 C.F.R. 657.5(a)(1)). Soils are classified as prime farmland, prime farmland if drained, prime farmland if protected from flooding and farmland of statewide importance.

Under current drainage conditions, approximately 65 percent, 49 percent and 53 percent of the acreage in Dodge, Mower and Olmsted Counties, respectively, is considered prime farmland or farmland of statewide importance. An additional 26

percent, 48 percent and 13 percent of the land in Dodge, Mower and Olmsted Counties, respectively, is considered prime farmland if drained or protected from flooding (NRCS, 2005).

Permanent effects on agricultural land can include loss of land due to pole placement or substation construction. Temporary impacts during construction may include soil compaction, disruption of agricultural practices (e.g., center pivot irrigation or drain tile) and crop damage within the right-of-way.

Approximately 116 acres of right-of-way for the Preferred Route is located on prime farmland soils. The right-of-way also includes ditches and other non-cultivated farmland. Approximately 66 percent, 27 percent and 1 percent of the soils within the route are listed as prime farmland, prime farmland if drained and prime farmland if protected from flooding, respectively. Nearly two percent of the soils along the route are listed as farmland of statewide importance. Table 16 identifies the farmland types within the Preferred Route.

Table 16: Farmland within the Preferred Route

Farmland Type	Area (acres)	Percent of Total Area
Prime Farmland	116.4	65.5
Prime if Drained	48.7	27.4
Prime Farmland if Protected from Flooding	1.4	0.8
Statewide Importance	3.2	1.8
Other	8.0	4.5
Total	177.7	100.0

Approximately 121 acres of right-of-way for the Alternate Route is located on prime farmland soils. The right-of-way also includes ditches and other non-cultivated farmland. Approximately 69 percent, 19 percent and 2 percent of the soils within the route are listed as prime farmland, prime farmland if drained and prime farmland if protected from flooding, respectively. An additional 6 percent of the soils along the route are listed as farmland of statewide importance. Table 17 identifies the farmland types within the Alternate Route.

Table 17: Farmland within the Alternate Route

Farmland Type	Area (acres)	Percent of Total Area
Prime Farmland	121.3	68.8
Prime Farmland if Drained	33.4	19.0
Prime Farmland if Protected from Flooding	3.6	2.0
Statewide Importance	9.9	5.6
Other	8.0	4.6
Total	176.2	100.0

Approximately 13 acres of right-of-way for the Connector Segment are located on prime farmland soils. The right-of-way also includes ditches and other non-cultivated farmland. Approximately 65 percent, 7 percent and 1 percent of the soils within the segment are listed as prime farmland, prime farmland if drained and prime farmland if protected from flooding, respectively. About 21 percent of the soils along the segment are listed as farmland of statewide importance. Table 18 identifies the farmland types within the Connector Segment.

Table 18: Farmland within the Connector Segment

Farmland Type	Area (acres)	Percent of Total Area
Prime Farmland	12.8	65.4
Prime Farmland if Drained	1.3	6.9
Prime Farmland if Protected from Flooding	0.2	1.0
Statewide Importance	4.2	21.3
Other	1.1	5.4
Total	19.6	100.0

Mitigative Measures

Landowners will be compensated for the use of their land through easement payments. To minimize loss of farmland and to ensure reasonable access to the land near poles, Xcel Energy intends to place the poles on private property approximately five feet away from the road right-of-way which would allow the transmission line to overhang the roadway right-of-way.

When possible, an attempt will be made to construct the transmission line before crops are planted or following harvest and landowners will be compensated for crop

damage and soil compaction that occurs as a result of the Project. Soil compaction will be addressed by compensating the farmer to repair the ground or by using contractors to chisel-plow the site. Typically, a declining scale of payments is set up over a period of a few years.

To further minimize agricultural impacts, springtime construction will be avoided to the extent possible. However, if construction during springtime is necessary, disturbance to farm soil from access to each structure location will be minimized by using the shortest access route. This may require construction of temporary driveways between the roadway and the structure but would limit traffic on fields between structures. Construction mats may also be used to minimize impacts on the access paths and in construction areas.

6.3.3 Forestry

There are no federal forests located within the Project Area. See Appendix D, Figure D-2. The Project Area is primarily farmland with no forest production.

Historically, the areas along the Preferred Route and Alternate Route and Connector Segment have experienced a large decrease in natural forest, particularly a reduction in bur oak trees. The majority of trees present within the vicinity of the routes are associated with streams and agricultural windbreaks, with occasional small wooded uplands. Trees are also located adjacent to farmsteads and other residences. The Alternate Route contains one large wooded area. See Appendix A, Figure A-3.

Mitigative Measures

No substantial forest impacts are expected; therefore, no mitigative measures have been proposed.

6.3.4 Tourism

Agri-tourism represents the major tourism resource within the Project Area. Tweite's Pumpkin Patch is located within the vicinity of the Preferred Route and the Alternate Route, south of the City of Byron. See Appendix D, Figure DE-2. This business offers a variety of activities related to agri-tourism including corn mazes, U-pick

pumpkin patches and other amusement activities. Xcel Energy consulted with the owner of the Pumpkin Patch during the route selection process. The landowner requested that structure placement in this area accommodate public use areas, if possible, during detailed design of the transmission line. This request will be accommodated if it does not conflict with other land use constraints, such as residences along the route.

The Alternate Route and the Connector Segment are not located near any tourist attractions that would be affected.

Mitigative Measures

No effects on tourism are expected; therefore, no mitigative measures have been proposed.

6.3.5 Mining

Gravel pits, rock quarries and commercial aggregate sources are located within the Project Area. These sources can easily be avoided during detailed design of the proposed transmission lines.

Mitigative Measures

No effects on mining are expected; therefore, no mitigative measures have been proposed.

6.3.6 Archaeological and Historic Resources

The Project Area lies within the Southeast Riverine archaeological region of Minnesota. The Project is also located within an area of Minnesota that was not heavily influenced by glaciers. Because this landscape differs from the majority of Minnesota, it may contain pre-settlement artifacts – including rock shelters, quarries and lithic (stone tool) processing sites – not found in other regions.

10,000 Lakes Archeology, Inc. conducted Phase Ia background research for the Project Area in Summer 2008, and examined the Minnesota Archaeological Site Files

and Minnesota Architectural History Site Files at the SHPO, historic maps, and other information, to determine if any historic, archaeological or American Indian ceremonial sites had been recorded within the proposed Project Area. This research identified archaeological sites, historic sites and areas with high potential for cultural resources. See Appendix D, Figure D-3.

The Phase Ia review of existing cultural resources identified three archaeological sites and nine historic sites within 0.5 miles of the Preferred Route. See Appendix D, Figure D-3. Table 19 identifies these archaeological and historic sites.

Table 19: Archeological and Historic Sites within the Preferred Route

Site Number	Site Type	Location (Township, Range, Section (TRS))
Archeological Sites		
21DO0003	Lithic Scatter	T105 R16 S12
21DOae	Sacred Cultural Property	T104 R15
21OL0034	Lithic Scatter	T104 R15 S6
Historic Sites		
DO-CAN-001	Ole Carlson House	T106 R16 S25
DO-CAN-002	George W. Gleason Farmstead	T106 R16 S13
DO-CAN-003	Charles Van Allen House	T106 R16 S14
DO-CAN-004	School	T106 R16 S26
DO-CAN-005	School	T106 R16 S12
DO-VRN-0011	Bridges	T105 R16 S23
DO-VRN-0012	School	T105 R16 S12
DO-VRN-0013	Bridge No. 6746	T105 R16 S24
DO-VRN-0014	Bridge No. 89136	T105 R16 S23

One archaeological site and three historic sites are recorded within 0.5 miles of the Alternate Route. See Appendix D, Figure D-3. In addition, there are two non-registered historic houses within the area. Table 20 identifies these archaeological and historic sites.

Table 20: Archeological and Historic Sites within the Alternate Route

Site Number	Site Type	Location (TRS)
Archeological Sites		
21OL0020	Artifact Scatter	T106 R15 S20
Historic Sites		
OL-SLM-002	Log House	T106 R15 S7
OL-SLM-008	Bridge No. 55510	T106 R15 S19
OL-HFT-003	Bridge No. L6150	T104 R15 S5
Additional Structures		
NA	Historic House	T104 R15 S08
NA	Historic House	T105 R15 S19

No archaeological or historic sites are recorded are recorded within 0.5 miles of the Connector Segment.

Mitigative Measures

No effects are anticipated on cultural resources from the construction of either the Preferred Route or Alternate Route or the Connector Segment. A copy of the Phase 1a Survey will be provided to the SHPPO along with a copy of this application. If an artifact is discovered during construction, it will be determined, in consultation with SHPO, whether or not the resource is eligible for listing in the NRHP. If a potentially eligible artifact cannot be spanned to avoid it, additional survey work may be necessary using standard Phase I or Phase II survey methods. Any necessary surveys will be completed prior to construction activities.

6.4 Natural Environment

6.4.1 Air Quality

Currently, both state and federal governments regulate permissible concentrations of ozone and nitrogen oxides. The national standard is 0.08 parts per million ("ppm") during an eight-hour averaging period. The state standard is 0.08 ppm based upon the fourth-highest eight-hour daily maximum average in one year.

The only potential air emissions from a transmission line result from corona, and such emissions are limited. Corona consists of the breakdown or ionization of air within a few centimeters immediately surrounding conductors and can produce ozone and

oxides of nitrogen in the air surrounding the conductor. For a transmission line, the conductor gradient surface is usually below the air breakdown level. Typically, some imperfection such as a scratch on the conductor or a water droplet is necessary to cause corona.

Ozone is not only produced by corona, but also forms naturally in the lower atmosphere from lightning discharges and from reactions between solar ultraviolet radiation and air pollutants such as hydrocarbons from auto emissions. The natural production rate of ozone is directly proportional to temperature and sunlight and inversely proportional to humidity. Thus, humidity (or moisture), the same factor that increases corona discharges from transmission lines, inhibits the production of ozone. Ozone is a reactive form of oxygen and combines readily with other elements and compounds in the atmosphere. Because of its reactivity, it is relatively short-lived. The areas near the Preferred Route and Alternate Route presently meets all federal air quality standards.

During construction of the proposed transmission lines, emissions from vehicles and other construction equipment and fugitive dust from right-of-way clearing will be limited. Air-quality impacts during the construction phase will also be temporary.

The magnitude of construction emissions is heavily influenced by weather conditions and the specific construction activity. Exhaust emissions, primarily from diesel equipment, will vary according to the phase of construction, but will be minimal and temporary. Adverse impacts to the surrounding environment will be minimal because of the short and intermittent nature of the emission and dust-producing construction phases.

Mitigative Measures

No effects are anticipated for air quality; therefore, no mitigative measures are proposed.

6.4.2 Water Resources

The water resources located in the Project Area are identified in Appendix D, Figure D-4. Impacts on water quality are only possible during the construction phase of the

Project, when sediment could possibly reach surface waters as excavation, grading and construction traffic disturb the ground.

Mitigative Measures

No impacts are anticipated for water quality. Implementation of BMPs to prevent water quality impacts are discussed in Section 5.3. The construction, restoration and maintenance of the transmission lines is also discussed in Section 5.3.

6.4.3 Minnesota Public Waters Inventory

The MnDNR PWI identifies lakes, wetlands and watercourses over which the MnDNR has regulatory jurisdiction. The statutory definition of public waters can be found in Minn. Stat. Section 103G.005, Subdivisions 15 and 15a. A MnDNR License to Cross Public Waters will be required for designated crossings.

The Preferred Route crosses eight PWI watercourses, including the North Branch Root River, Sargeant Creek, Cascade Creek, Salem Creek, South Fork Zumbro River and two unnamed perennial streams. See Appendix D, Figure D-4. The route crosses each watercourse once, with the exception of one of the unnamed streams, which is crossed twice. A corridor located within 500 feet of the ordinary high water mark of Salem Creek in Canisteo Township, Dodge County, is designated as a conservation corridor. See Appendix D, Figure D-4. This area will need to be avoided during detailed Project design.

The Alternate Route crosses seven PWI watercourses, including the North Branch Root River, Zumbro River, Salem Creek, an unnamed tributary to Salem Creek and Cascade Creek. The route crosses each watercourse once, with the exception of Salem Creek which has three crossings. See Appendix D, Figure D-4.

The Connector Segment does not cross any PWI watercourses. See Appendix D, Figure D-4.

Mitigative Measures

No work in public waters or direct impacts to surface water resources are anticipated. Therefore, no Public Waters Work Permit is required from the MnDNR under Minn. Stat. Section 103G.2455, subdivision 1. Xcel Energy is required to obtain a License to Cross Public Lands and Waters from the MnDNR Division of Lands and Minerals if the Lines pass over, under or across any state land or public waters, under Minn. Stat. Section 84.415. This license will include specific mitigation required for each PWI crossing. If waters of the United States, as defined by the U.S. Army Corps of Engineers ("ACOE") are affected, the required permits will be obtained. Currently no impacts are anticipated; therefore, no permit will be required.

6.4.4 Wetlands

Wetland locations were initially identified using the USFWS NWI maps and then verified and updated during the route selection process. See Appendix D, Figure D-4. Wetland types range from temporarily flooded basins to riverine wetlands. In addition to the wetlands described below, there are streams and other waterways that cross farms and other parts of the Project Area. The Project design will incorporate spacing of structures to span the wetlands and waterways as possible.

The Preferred Route spans approximately 1.5 miles across 22 wetlands within the right-of-way. The USFWS Cowardin Classification System (USFWS 1979) classifies eight wetlands as Palustrine Emergent Saturated Basins ("PEMB") or wet meadows. These areas are typically within a wetland complex and are often used as pasture areas for livestock. Four wetlands are classified as Palustrine Shrub-Scrub Saturated Basins ("PSSB") or shrub swamps. Wet meadows and shrub swamp wetland types represent about 60 percent of the wetland area in the right-of-way. The remaining wetlands include temporarily flooded basins, marshes, forested wetlands and wetlands associated with river systems. Table 21 summarizes wetlands located in the right-of-way of the Preferred Route.

Table 21: Wetlands within the Preferred Route

County	Township	Range	Section	Wetland Type[1]	Wetlands Spanned (miles)
Dodge	105	16	1	PEMB	0.08
Dodge	106	16	12	PEMB	0.06
Dodge	106	16	23	R2USA	0.03
Dodge	107	16	36	PEMC	0.09
Dodge	105	16	12	PEMB	0.11
Dodge	105	16	11	R2USA	0.01
Dodge	105	16	11	PEMB	0.04
Dodge	105	16	14	PEMA	0.06
Dodge	105	16	14	PSS1B	0.06
Dodge	105	16	23	PSS1B	0.13
Dodge	105	16	23	PFO1A	0.02
Dodge	105	16	23	PFO1A	0.08
Dodge	105	16	23	PFO1A	0.09
Dodge	105	16	23	PEMA	0.06
Dodge	105	16	26	PSS1/EMB	0.11
Dodge	105	16	35	PEMB	0.03
Mower	104	16	1	PEMB	0.09
Mower	104	15	7	PFO1A	0.03
Mower	104	15	7	PFO1A	0.13
Mower	104	16	12	PEMB	0.05
Mower	104	16	13	PEMB/C	0.04
Olmsted	107	15	31	PSSB	0.12
Total					1.52

[*] *Using the USFWS Cowardin Classification System for wetlands, the wetland types include: PEMA – Palustrine Emergent Temporarily Flooded; PEMB – Palustrine Emergent Saturated; PEMC – Palustrine Emergent Seasonally Flooded; PFO1A – Palustrine Forested Deciduous Temporarily Flooded; PSSB – Palustrine Shrub-Scrub Saturated; and R2USA – Riverine Lower Perennial Unconsolidated Shore.*

The Alternate Route spans approximately 1.2 miles across 22 wetlands within the right-of-way. The Cowardin System classifies 11 wetlands as wet meadows. This wetland type represents approximately 58 percent of the wetland area in the right-of-way. These areas are typically within a wetland complex and are often used as pasture areas for livestock. Forested wetlands along rivers and streams represent approximately 17 percent of the wetlands in the right-of-way. Table 22 summarizes wetlands located within the right-of-way of the Alternate Route.

Table 22: Wetlands within the Alternate Route

County	Township	Range	Section	Wetland Type*	Wetlands Spanned (miles)
Mower	104	15	7	PEMB	0.05
Olmsted	105	15	5	PEMB	0.08
Olmsted	105	15	5	PFO1A	0.08
Olmsted	106	15	5	PEMB	0.12
Olmsted	106	15	7	PEMBd	0.04
Olmsted	106	15	19	PFO1A	0.03
Olmsted	106	15	19	PFO1A	0.05
Olmsted	106	15	19	R2USA	0.03
Olmsted	106	15	30	PUGBx	0.02
Olmsted	106	15	6	PEMC	0.01
Olmsted	107	15	31	PEMC	0.03
Olmsted	104	15	6	PEMB	0.14
Olmsted	104	15	6	PFO1A	0.05
Olmsted	105	15	5	PEMB	0.07
Olmsted	105	15	8	PEMB	0.03
Olmsted	105	15	8	PSS1/EMBd	0.06
Olmsted	105	15	8	PSSB	0.09
Olmsted	105	15	8	PEMBd	0.03
Olmsted	105	15	17	PEMB	0.06
Olmsted	105	15	17	PEMBd	0.05
Olmsted	105	15	17	PSS1Bd	0.06
Olmsted	105	15	30	PEMB	0.03
Total					1.21

**Using the USFWS Cowardin Classification System for wetlands, the wetland types include: PEMB – Palustrine Emergent Saturated; PEMBd – Palustrine Emergent Saturated Partially Drained/Ditched; PFO1A – Palustrine Forested Deciduous Temporarily Flooded; PSS1B – Palustrine Shrub-Scrub Deciduous Saturated; PUGBx – Palustrine Unconsolidated Bottom Excavated; and R2USA – Riverine Lower Perennial Unconsolidated Shore.*

The Connector Segment spans about 0.2 miles across two wetlands within the right-of-way. See Appendix D, Figure D-4. The Cowardin System classifies the wetlands as shrub swamps. Table 23 summarizes wetlands within the right-of-way of the Connector Segment.

Table 23: Wetlands within the Connector Segment

County	Township	Range	Section	Wetland Type*	Wetlands Spanned (miles)
Dodge	106	16	36	PSSB	0.12
Olmsted	106	15	31	PSSB	0.11
Total					0.23

**Using the USFWS Cowardin Classification System for wetlands, the wetland types include: PEMB – Palustrine Emergent Saturated; and PEMBd – Palustrine Emergent Saturated Partially Drained/Ditched.*

Mitigative Measures

During construction, the most effective way to minimize impacts to wetland areas will be to span wetlands to the extent possible. In addition, crossing wetlands with equipment will be avoided except where necessary. Where wetlands must be crossed to pull in the new conductors and shield wires, workers may walk or drive equipment across ice in the winter. These construction practices will help prevent soil erosion and ensure that equipment fueling and lubricating will occur at a distance from wetlands. Xcel Energy will follow standard erosion control measures identified in the MPCA Stormwater BMP Manual, such as using silt fencing to minimize impacts to adjacent water resources.

Impacts to wetlands will be minimized through appropriate construction practices. Construction crews will maintain sound water and soil conservation practices during construction and operation of the facilities to protect topsoil and adjacent water resources and minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored soil. Crews will avoid major disturbance of individual wetlands and drainage systems during construction. This will be accomplished by strategically locating new access roads and spanning wetlands and drainage systems where possible.

The Project design will incorporate spacing of structures to span wetlands and streams to the extent possible. However, it is possible that a few poles could be placed within wetlands; any necessary permits will be obtained after design is completed. When it is not feasible to span the wetland, construction crews will use several methods to minimize impacts:

- When possible, construction will be scheduled for when the ground is frozen.
- Crews will attempt to take the shortest route when they access the wetland.
- The structures will be assembled on upland areas before they are brought to the site for installation.
- When construction during winter is not possible, construction mats will be used where wetlands would be affected.

If waters of the United States, as defined by the ACOE, or wetlands, as defined under the Minnesota Wetland Conservation Act, are affected, Xcel Energy will obtain the required permits.

6.4.5 Floodplain

Floodplain resources were identified for the Project Area using maps created by FEMA (1981).

The Preferred and Alternate Route and Connector Segment are not within floodplains or floodways mapped by FEMA. See Appendix D, Figure D-4.

Mitigative Measures

Xcel Energy does not anticipate that the Preferred Route and Alternate Route or Connector Segment will affect floodplain resources.

During construction, sediment could possibly reach surface waters as ground is disturbed by excavation, grading or construction traffic. A National Pollution Discharge Elimination System ("NPDES") stormwater permit will be applied for, if necessary. In addition, standard erosion control measures identified in the applicable Stormwater BMP Manual will be followed.

The BMPs may include using silt fences to minimize the potential for erosion and sedimentation into water bodies within the Project Area. Xcel Energy will maintain sound water and soil conservation practices while building and operating the

transmission line, to protect topsoil and adjacent water resources and to minimize soil erosion. Practices may include containing excavated material, protecting exposed soil and stabilizing restored soil. With implementation of BMPs, the Project is not expected to affect water quality (*i.e.*, fecal coliform or total suspended solids levels) within the watershed. Once the Project is completed, it will have no impact on surface water quality.

6.4.6 Flora and Fauna

Flora

The majority of the land adjacent to the Preferred Route and Alternate Route and Connector Segment is cultivated and contains row crops, pasture and hay lands. Row crops in the area primarily consist of corn and soybeans.

Several areas of agricultural land that are currently within the Conservation Reserve Program ("CRP") are located within the Project Area. The CRP program provides an opportunity to convert highly erodible cropland or environmentally sensitive area to permanent vegetative cover, such as grasses or trees. Permanent impacts to agriculture, such as loss of land due to placement of poles or structures, and temporary impacts to agriculture, such as compaction and clearing in the right of way, will likely occur. For a discussion on agriculture impacts see Section 6.3.2.

The majority of trees within the Project Area are associated with streams and windbreaks or with occasional small wooded uplands. Trees are also found adjacent to residences. Impacts to trees will be minimized to the extent possible through detailed Project design. The potential tree impacts for the Preferred and Alternate routes are summarized in Section 6.4. Trees near residences could be affected at 10 locations along the Preferred Route, at seven locations along the Alternate Route and at one location along the Connector Segment.

Mitigative Measures

Xcel Energy has selected a Preferred Route and an Alternate Route that avoid occupied residences and associated trees as much as reasonably possible. In addition, during detailed design, the new transmission lines will be placed on the opposite side

of the road from residences and to avoid existing trees where possible. To minimize impacts to trees, only trees located in the transmission line right-of-way will be removed, or those trees that would affect the safe operation of the line. Trees outside the right-of-way that may need to be removed would primarily include trees that are unstable and could potentially fall into the transmission facilities.

Fauna

Wildlife in the Project Area consists primarily of deer, small mammals, waterfowl, raptors and perching birds. These species are typically observed in areas that are primarily agricultural, with limited opportunities for nesting and cover.

Potentially, wildlife could temporarily be displaced and small amounts of habitat could be lost from the Project Area during construction. Wildlife that inhabits trees that may be removed during the Project, along with wildlife that inhabits agricultural areas, will likely be temporarily displaced. Similar tree and agricultural habitats are found adjacent to the routes; therefore, it is likely that these species would only be displaced a short distance.

The primary potential impact presented by transmission lines is the potential injury and death of raptors, waterfowl and other large bird species. Large birds, such as raptors, can potentially be electrocuted by transmission lines. This can occur when birds with large wingspans come in contact with two conductors or with a conductor and a grounding device. Xcel Energy's transmission line design standards, however, provide adequate spacing to eliminate such risks, so it is unlikely that any birds will be electrocuted as a result of the proposed Project.

The land use within the vicinity of the Preferred and Alternate routes and Connector Segment is predominantly agricultural, and although wildlife is present in the area, they are not likely to nest there. Avian collisions are possible in areas where agricultural fields serve as feeding areas, as well as in wetlands and on open water. Both routes are oriented north-south, except for a couple of small sections and the Connector Segment that are oriented east-west. Although the potential for avian collision exists, impacts are much less likely given that migratory birds generally follow a north-south orientation.

Mitigative Measures

Displacement of fauna is anticipated to be minor and temporary in nature, and no long-term population-level effects are anticipated. Xcel Energy has been working with various state and federal agencies over the past 20 years to address avian issues as quickly and efficiently as possible. In 2002, Xcel Energy entered into a voluntary Memorandum of Understanding ("MOU") with the USFWS to work together to address avian issues throughout its service territories. This includes the development of Avian Protection Plans ("APP") for each state Xcel Energy serves: Minnesota, South Dakota and North Dakota.

The primary methods Xcel Energy uses to address avian issues for transmission projects include:

- Working with resource agencies to identify any areas that may require marking transmission line shield wires or using alternate structures to reduce collisions. Resource agencies include the MnDNR, USFWS and the ACOE.

- Attempting to avoid areas known as major flyways or migratory resting spots.

6.4.7 Rare and Unique Natural Resources

The MnDNR Natural Heritage Information System ("NHIS") database was queried to obtain the locations of rare and unique natural resources across the Project Area. Queries to the NHIS database often display species that either do not have a status or are of special concern (referred to as "SPC" in the tables below). Species or communities that do not have a status, or are classified as special concern, have no legal protection in Minnesota.

Wetlands and other waters can be spanned by the transmission lines; therefore, impacts to listed aquatic species will be avoided. Because of this, only potential impacts to non-aquatic species with legal protection (threatened and endangered) are discussed below. However, complete lists of the rare and unique resources obtained from the NHIS database query for the Preferred and Alternate routes are provided in Appendix E. These lists include all terrestrial and aquatic species and communities

with or without legal protection obtained in the queries. In addition, Appendix D, Figure D-5 shows the general locations of the rare and unique resources obtained from the NHIS database query.

Within one mile of the Preferred Route, the NHIS database identified five rare and unique resources. See Appendix E, Figure F-5. Species include the northern cricket frog, the wood turtle, the loggerhead shrike, timber rattlesnake and a vascular plant, the prairie bush clover. The northern cricket frog is listed as endangered at the state level, while the other three species are listed as threatened at the state level. Prairie bush clover is also listed as threatened at the federal level, while the other three species are not listed. The northern cricket frog and the wood turtle are typically found in wetland habitats. Table 24 summarizes the species found, their habitats and their federal and state status for the Preferred Route.

Table 24: Rare and Unique Resources within the Preferred Route

Common Name	Scientific Name	Number of Occurrences	Most Recent Occurrence	Federal Status*	MN Status	State Rank	Habitat
Prairie bush clover	*Lespedeza leptostachya*	7	2004	LT	THR	S2	Upland - plant
Northern cricket frog	*Acris crepitans*	1	1966	No Status	END	S1	Wetland - frog
Wood turtle	*Clemmys insculpta*	1	1979	No Status	THR	S2	Wetland - turtle
Loggerhead shrike	*Lanius ludovicianus*	4	1989	No Status	THR	S2B	Upland - bird
Timber rattlesnake	*Crotalus horridus*	1	1958	No Status	THR	S2	Upland - reptile

**At the federal level, "LT" refers to species that are listed as threatened at the federal level and "No Status" refers to species that are not listed at the federal level and therefore do not have federal protection. At the state level, "END" refers species listed as endangered at the state level and "THR" refers to species listed as threatened at the state level. In addition, Minnesota also assigns a rank to listed species. This rank reflects the known extent and condition of that species. Ranks range from S1 (in greatest need of conservation action in the state) to S5 (secure under present conditions) to SU (undetermined, more information is needed).*

Wetlands will be avoided as discussed above in Section 6.4.4; therefore, the cricket frog and wood turtle are unlikely to be affected. The loggerhead shrike is a migratory song bird that inhabits relatively open land with some shrub cover. This bird is not likely to nest or reside in agricultural fields. The proposed Project is therefore not likely to affect loggerhead shrike populations or their habitats. The timber rattlesnake

is primarily found on prairies on south or southwest facing steep slopes in the bluff areas of Olmstead County. This habitat is not generally found in the western portion of Olmstead County. Prairie bush clover also inhabits remnants of native tall grass prairie. Although the majority of the Project Area is agricultural, a few small fragments of native prairie may be present. After detailed planning has been completed, field surveys may be conducted to avoid impacts to the prairie bush clover (see Mitigative Measures section below).

Within one mile of the Alternate Route, the NHIS database identified four rare and unique resources. See Appendix D, Figure D-5. Species include the loggerhead shrike, timber rattlesnake and two vascular plants, valerian and glade mallow. All four species are listed as threatened at the state level. None of these species are listed at the federal level. Table 25 summarizes the species, their habitats and their federal and state status for the Alternate Route.

Table 25: Rare and Unique Resources within the Alternate Route

Common Name	Scientific Name	Number of Occurrences	Most Recent Occurrence	Federal Status *	MN Status	State Rank	Habitat
Glade Mallow	*Napaea dioica*	2	2002	No Status	THR	S2	Wetland-plant
Valerian	*Valeriana edulis ssp. ciliata*	1	1994	No Status	THR	S2	Wetland - plant
Loggerhead Shrike	*Lanius ludovicianus*	4	1989	No Status	THR	S2B	Upland - bird
Timber rattlesnake	*Crotalus horridus*	1	1958	No Status	THR	S2	Upland - reptile

**At the federal level, "No Status" refers to species that are not listed at the federal level and therefore do not have federal protection. At the state level, "THR" refers to species listed as threatened at the state level. In addition, Minnesota also assigns a rank to listed species. This rank reflects the known extent and condition of that species. Ranks range from S1 (in greatest need of conservation action in the state) to S5 (secure under present conditions) to SU (undetermined, more information is needed).*

Glade mallow and valerian are typically found in wetlands habitats. Wetlands will be avoided as discussed above in Section 6.4.4; therefore, the glade mallow and valerian are unlikely to be affected. The loggerhead shrike is a migratory song bird that inhabits relatively open land with some shrub cover. The proposed Project is therefore unlikely to affect loggerhead shrike populations or their habitats. Timber

rattlesnake is primarily found on prairies on south or southwest facing steep slopes in the bluff areas which unlikely to be affected.

Within one mile of the Connector Segment, the NHIS database identified five rare and unique resources. See Appendix D, Figure D-5. Species include loggerhead shrike, timber rattlesnake and three vascular plants, glade mallow, valerian and prairie bush clover. These species are listed as threatened at the state level. None of these species are listed at the federal level. Table 26 summarizes the species, their habitats and their federal and state status for the Connector Segment.

Table 26: Rare and Unique Resources within the Connector Segment

Common Name	Scientific Name	Number of Occurrences	Most Recent Occurrence	Federal Status*	MN Status	State Rank	Habitat
Prairie bush clover	*Lespedeza leptostachya*	1	2004	No Status	THR	S2	Upland - plant
Glade Mallow	*Napaea dioica*	2	2002	No Status	THR	S2	Wetland - plant
Valerian	*Valeriana edulis ssp. ciliata*	1	1994	No Status	THR	S2	Wetland - plant
Loggerhead Shrike	*Lanius ludovicianus*	2	1989	No Status	THR	S2B	Upland - bird
Timber Rattlesnake	*Crotalus horridus*	1	1958	No Status	THR	S2	Upland - reptile

**At the federal level, "No Status" refers to species that are not listed at the federal level and therefore do not have federal protection. At the state level, "THR" refers to species listed as threatened at the state level. In addition, Minnesota also assigns a rank to listed species. This rank reflects the known extent and condition of that species. Ranks range from S1 (in greatest need of conservation action in the state) to S5 (secure under present conditions) to SU (undetermined, more information is needed).*

Glade mallow and valerian is typically found in wetlands habitats. Wetlands will be avoided as discussed above in Section 6.4.4; therefore, the glade mallow is unlikely to be affected. The loggerhead shrike is a migratory song bird that inhabits relatively open land with some shrub cover; therefore the Project is unlikely to affect loggerhead shrike populations or their habitats. The prairie bush clover and timber rattlesnake are unlikely to be affected by the Project.

Mitigative Measures

Wetlands will be avoided as discussed above in Section 6.4.4. If wetland access is necessary, it will take place in the winter when the ground is frozen, in order to minimize impacts. To mitigate potential impacts to the wetland and aquatic species and communities, structures and poles will be placed so that the conductor spans water bodies, watercourses and wetlands to the extent possible. Sediment will be controlled so that it does not reach aquatic and wetland habitats. To prevent impacts to the prairie bush clover, all likely habitats where this plant species would reside may be surveyed. The prairie bush clover flowers in mid-July in Minnesota (USFWS 2000); therefore, any necessary surveys for this plant and species commonly associated with it would occur in mid-July, prior to any construction.

6.5 Comparison of the Preferred Route and Alternate Route

The extent of the area used to compare the issues for the Preferred Route and Alternate Route varied depending on the issues including: aesthetics, cultural values, recreation, public services, forestry, tourism, mining, electrical system reliability and fauna were identified within the Project Area; rare and unique natural resources were identified within 1.0 mile of the route centerline; the archaeological and historic resources were identified within 0.5 miles of the route centerline; air quality, water quality, route specific design issues and existing infrastructure were identified within the 400-foot route width; residences, noise and public health and safety were identified within 300 feet of the route centerline; and agriculture, public water crossings, wetlands, floodplains and flora were identified within the 80-feet right-of-way width. For each issue, the potential effect of the each route is briefly summarized or it was determined there was no effect for the issue.

There are no anticipated effects for issues including: noise, displacement of residents, aesthetics, cultural values, recreation, public services, public health and safety, forestry, air quality, water quality, floodplains, flora and fauna, electrical system reliability and pole placement and loss of prime farmland. For other issues, the effects for the two routes are similar, including: agriculture, archaeological resources, historic resources, public water crossings and wetlands.

The primary differences between the two routes are the effects on the following issues: agri-tourism, residences, route specific infrastructure, existing rights-of-ways, loss of trees and river crossings. Based on the impacts resulting from these issues, the Preferred Route was identified as having fewer impacts than the Alternate Route as follows:

- The Preferred Route and Alternate Route generally cross the same type of landscape in a predominantly rural, agricultural setting. To minimize impacts to farm fields, the Preferred Route shares roads and railroad corridors for 98 percent of the route, while the Alternate Route follows infrastructure for 88 percent of the route.

- The cover types include primarily agricultural crops with some windbreaks, forested areas, wetlands and streams. Trees are generally found in windbreaks associated with residences rather than in large tracts of forest. Tree removal may be required at ten locations on the Preferred Route compared to seven locations on the Alternate Route.

- The Salem Creek crossing is common for both routes and may require additional design to span the river valley in both locations. However, there is a larger tract of forest associated with the Salem Creek crossing. The distance across the Salem Creek river valley is about 0.5 miles shorter for the Preferred Route compared to the Alternate Route. The Preferred Route follows a road right-of-way through the Salem Creek Valley while the Alternate Route crosses agricultural land and forest through the Salem Creek Valley, requiring clearing for a new corridor through the forested valley. Therefore, environmental impacts are minimized at the Salem Creek crossing for the Preferred Route.

- The impacts to residences are minimized for both routes. The Preferred Route has 11 residences within 100-200 feet of the route centerline compared to 14 residences within 100-200 feet of the route centerline for the Alternate Route. Within 300 feet of the route centerline, there are 25 residences for the Preferred Route and 26 residences for the Preferred Route and Alternate Route.

- The Preferred Route passes an agri-tourism business that may require pole placement near or on the property for the Project.

Table 27 summarizes Applicant's application of the factors set forth in Minn. R. 7850.4100 for the Preferred Route and Alternate Route.

Table 27: Summary of Preferred and Alternate Routes

Issue	Preferred Route	Alternate Route	Comparison of Routes
Effects on Human Settlement			
Residences within 300 feet of the route centerline	25 residences within 300 feet of the route	26 residences within 300 feet of the route	One residence is located within 40 to 100 feet of the Preferred Route centerline and no residences are located within 100 feet of the Alternate Route centerline
Displacement	No effect	No effect	No differences
Noise	No effect	No effect	No differences
Aesthetics	Viewshed will include the transmission lines and poles	Viewshed will include the transmission lines and poles	No differences
Cultural Values	No effect	No effect	No differences
Recreation	No effect	No effect	No differences – same types of recreational opportunities
Public Services	City of Byron sewer and water will not be affected; rural septic systems will not be affected	City of Byron sewer and water will not be affected; rural septic systems will not be affected	No differences
Effects on Public Health and Safety			
Public Health and Safety	No impacts from noise or EMF	No impacts from noise or EMF	No differences
Effects on Land-based Economics			
Agriculture	Crosses 96 percent prime farmland	Crosses 95 percent prime farmland	No differences
Forestry	No effect	No effect	No forestry practices in the Project Area
Tourism	Agri-tourism – Tweite's Pumpkin Patch farm	No effect	Preferred Route would require placement of two poles in or on Tweite's farm
Mining	No effect	No effect	No differences
Effects on Archaeological and Historic Resources			
Archaeological Resources	3 - includes 2 lithic scatters and 1 burial mound sites	1 - includes 1 artifact scatter site	Sites are located within 0.5 miles of both routes
Historic Resources	9 - includes 2 house, 1 farmstead, 3 school and 3 bridge sites	5 - 1 log home, 2 bridge and 2 historic home sites	Sites are located within 0.5 miles of both routes
Effects on the Natural Environment			
Air Quality	No effect	No effect	No differences
Water Quality	No effect with	No effect with	No differences

Issue	Preferred Route	Alternate Route	Comparison of Routes
	implementation of BMPs	implementation of BMPs	
Public Water Crossings	8 crossings – includes one conservation corridor adjacent to the route	7 crossings	Routes are orientated north-south, so cross the same streams and tributaries of those streams with multiple crossings of some streams and tributaries for both routes
Wetlands	1.5 miles spanned in the right-of-way; 22 wetland crossings	1.2 miles spanned in the right-of-way; 20 wetland crossings	Wetlands are generally located along watercourses or associated with wooded areas
Floodplains	No effect	No effect	The routes are not located within a mapped floodplain
Flora	10 locations potentially requiring tree removal	7 locations potentially requiring tree removal	Preferred Route may require tree removal at 3 additional locations
Fauna	No effect	No effect	Similar fauna is expected to be present throughout the Project Area
Rare and Unique Natural Resources	5 organisms– includes reported occurrences of northern cricket frog, wood turtle, loggerhead shrike, timber rattlesnake and prairie bush clover	4 organisms – includes reported occurrences of valerian, glade mallow, timber rattlesnake and the loggerhead shrike	Since the routes are orientated north-south, they generally cross the same type of habitat features, e.g., streams, agricultural land, etc.
Application of Design Options that maximize energy efficiencies, mitigate adverse environmental effects, and could accommodate expansion of transmission or generating capacity			
Route Specific	Follows existing infrastructure (roads)	Part of route goes cross county and does not follow existing infrastructure	Preferred Route follow existing infrastructure for the entire length.
Use or paralleling of existing right-of-way, survey lines, natural division lines and agricultural field boundaries			
Existing right-of-way, survey lines, natural division lines and agricultural field boundaries	98 percent shared right-of-way	93 percent shared right-of-way	Preferred Route shares right-of-way for an additional 5 percent of the length
Use of Existing Transportation, Pipeline and Electrical Transmission Systems or Right-of-Ways			
Existing transportation, pipeline and electrical transmission systems or rights-of-way	98 percent is within or adjacent to right-of-way with existing transportation rights-of-way	88 percent is within or adjacent to right-of-way with existing transportation rights-of-way	Preferred Routeis within or adjacent to a greater percentage of existing right-of-way
Electrical System Reliability			
Electrical System Reliability	Provides reliability to system	Provides reliability to system	No differences
Cost of Constructing, Operating and Maintaining the Facility which are Dependent on Design and Route			
Costs	$10,500,000 for construction; $300-500 per mile per year for maintenance	$10,900,000 for construction; $300-500 per mile per year for maintenance	Construction cost of the Preferred Route is $400,000 less than the Alternate Route; No differences in maintenance costs
Adverse Human and Natural Environmental Effects Which Cannot Be Avoided			
General	Pole placement and loss of prime farmland; tree	Pole placement and loss of prime farmland; tree	Generally, impacts are similar

Issue	Preferred Route	Alternate Route	Comparison of Routes
	impacts	impacts	
Irreversible and Irretrievable Commitments of Resources			
General	Pole placement and loss of prime farmland; tree impacts	Pole placement and loss of prime farmland; tree impacts	Generally, impacts are similar

7.0 Required Permits and Approvals

This Project will require a Certificate of Need and a Route Permit. Once the Commission issues a route permit, zoning, building and land use regulations and rules are preempted per Minn. Stat. § 216E.10, Subd. 1.

Table 28 identifies potentially required additional state and local permits.

Table 28: Potential Required Permits

Jurisdiction	Permit
State	
MnDNR	A Public Waters Work Permit would be required if any work were necessary in public waters.
MnDNR	License to Cross Public Waters
Minnesota Pollution Control Agency	As necessary, General Stormwater Permit for Construction Activities
Olmsted County	
Utility Permit	Utility permits are required for work proposed in the county highway rights-of-way. Work requiring this permit includes installation and repair of telephone cables, power lines, gas lines, storm sewers, sanitary sewers, water mains, ditch grading, culvert installation, etc.
Access Permit	Access permits are required for any changes proposed to driveway access or driveway widening along county highways.including field driveways, residential driveways, commercial driveways and public street access.
Oversize/Overweight Vehicle Permit	Permits required on all county highways.
Mower County	
Utility Permit	Utility permits are required for work proposed in the County Highway rights-of-way including installation and repair of telephone cables, power lines, gas lines, storm sewers, sanitary sewers, water mains, ditch grading, culvert installation, etc.
Moving Permit (Hauling)	Moving Permits are required whenever legal dimensions and/or axle weights are exceeded per County regulations.
Dodge County	
Access Permit	Access permits are required for any changes proposed to driveway access or driveway widening along county highways.including field driveways, residential driveways, commercial driveways and public street access.
Moving Permit (Hauling)	Moving Permits are required whenever legal dimensions and/or axle weights are exceeded per County regulations.
Culvert Extension/Connection	Permit required if extending/connecting culverts.
Utility Permit	Permit required if constructing on, across, or under the right-of-way of a county highway.
Working in the Right-of-Way Permit	If constructing on, across, or under the right-of-way of a county highway.
Culvert Extension/Connection	If extending or connecting culverts.

Permits that may be required from State and County agencies include:

Road Crossing Permits

These permits may be required to cross or occupy county, township or city road rights-of-way.

Lands Permits

These permits may be required to occupy county, township or city lands such as parklands, watershed districts or other properties owned by these entities.

Over-width Load Permits

These permits may be required to move over-width loads on county, township, or city roads.

Driveway/Access Permits

These permits may be required to construct access roads or driveways from county, township, or city roadways.

Public Waters Work Permit

The MnDNR Public Waters Work Permit regulates proposed projects in streams, lakes and wetlands as identified on the MnDNR PWI maps. If the work affects the course, current or cross-section of the water body, the work would be regulated under Minn. Stat. Section 103G.245. Winter construction in public waters would require this permit.

Public Water Crossing Permits

The MnDNR Division of Lands and Minerals regulates utility crossings on, over, or under any state land or public water identified on the PWI maps. A license to cross Public Waters is required under Minn. Stat. Section 84.415 and Minn. Rules, Chapter 6135. Xcel Energy works closely with the MnDNR on these licenses and will file for

them once the line design is complete. Work in these areas will not commence until permits, which will impose construction conditions, are obtained from the MnDNR.

8.0 References

Alexander, Jr., C., 1988, Sinkholes and Sinkhole Probability, University of Minnesota Geological Survey County Atlas Series (C-3).

City of Byron Zoning Code, City Code, Land Usage, accessed 09/2008, http://www.byronmn.com/index.asp?Type=B_BASIC&SEC={426E4183-29C8-4883-BFEE-6DCD1817B9F2}&DE={13D7BD31-653A-49CE-B4D8-0E402483763D}

City of Rochester Zoning Ordinance, accessed 09/2008, http://www.ci.rochester.mn.us/departments/planning_zoning/chapter60/pdf/60310zoningdistricts.pdf

Dodge County Zoning Ordinance, accessed 09/2008, http://www.co.dodge.mn.us/pdf/Dodge_County_Zoning_Ordinance_2006.pdf

Farmington Township Zoning Ordinance, accessed 09/2008, http://www.co.olmsted.mn.us/links/farmington.asp

Forest Soil-Climate-Site Index Relationships for Minnesota, 1992, accessed 09/2008, http://www.extension.umn.edu/distribution/naturalresources/components/6062b.html

Mayo Clinic, accessed 09/2008, http://www.mayoclinic.org/becomingpat-rst/.

Minnesota Department of Administration, accessed 09/2008, http://www.lmic.state.mn.us/datanetweb/index.html

Minnesota Department of Natural Resources, Minnesota Rare Species Guide; *Allium cernuum*, accessed 1/2009, http://www.dnr.state.mn.us/rsg/profile.html?action=elementDetail&selectedElement=PMLIL020J0

Minnesota Department of Natural Resources, Bald Eagles in Winter, accessed 09/2008, http://www.dnr.state.mn.us/birds/eagles/winter.html

Minnesota Department of Natural Resources, Ecological Classification System, accessed 09/2008, http://www.dnr.state.mn.us/ecs/222Lf/index.html; http://iic.gis.umn.edu/finfo/landscap/6/assess/se_assess_10_1.pdf

Minnesota Department of Natural Resources, Mining and Mineral Resources of Minnesota, accessed 09/2008, http://www.dnr.state.mn.us/lands_minerals/mining.html

Minnesota Department of Natural Resources, Division of Lands and Minerals/U.S. Geological Survey, 2004, Mineral Industry of Minnesota, accessed 09/2008, http://minerals.usgs.gov/minerals/pubs/state/2004/mnstmyb04.pdf

Minnesota Department of Natural Resources, Root River: a Canoe and Boating Guide, accessed 09/2008, http://files.dnr.state.mn.us/maps/canoe_routes/root.pdf.

Minnesota Department of Natural Resources, Zumbro River, accessed 09/2008, http://www.dnr.state.mn.us/canoeing/zumbroriver/index.html

Minnesota Department of Transportation, Mineral Resources, accessed 09/2008, http://www.dot.state.mn.us/materials/aggsource.html

Minnesota Forest Resources Council Landscape Program, Minnesota Southeast Landscape Current Conditions and Trends Assessment, accessed 09/2008, http://iic.gis.umn.edu/finfo/landscap/6/assess/se_assess_10_1.pdf

Mower County Zoning Ordinance, accessed 09/2008, http://www.co.mower.mn.us/pdf_files/Plan&Zone/ZoningOrdinance/Mower%20County%20Zoning%20Ordinance.pdf

Olmsted County Zoning Ordinance, accessed 09/2008, http://www.co.olmsted.mn.us/ordinances/docs/Planning/County/OC_Zoning_Ordinance_05_15_07.pdf

Olsen and Hobbs, 1988, Sensitivity of the Ground-Water System to Pollution, University of Minnesota Geological Survey County Atlas Series (C-3).

Rochester Municipal Airport Zoning Ordinance, accessed 09/2008, http://www.rochesterintlairport.com/zoning.php http://www.co.olmsted.mn.us/upload_dir/planning/airportzoningordinancenumber5.pdf

United States Census, 2000, accessed 09/2008, http://quickfacts.census.gov/qfd/states/27/27039.html

United States Fish and Wildlife Service, Prairie Bush Clover (Lespedeza leptostachya) Fact Sheet, accessed 01/2009, http://www.fws.gov/midwest/endangered/plants/prairieb.html

United States Department of Agriculture, 2002, Census, accessed 09/2008, http://www.agcensus.usda.gov/Publications/2002/index.asp

United States Department of Agriculture 1980, Soil Survey of Olmsted County, accessed 09/2008, http://soildatamart.nrcs.usda.gov/Manuscripts/MN109/0/olmsted.pdf

9.0 Definitions

Following are a list of definitions used in this Application:

Avian	Of or relating to birds.
A-weighted Scale	The sensitivity range for human hearing.
Conductor	A material or object that permits an electric current to flow easily.
Corona	The breakdown or ionization of air in a few centimeters or less immediately surrounding conductors.
Double circuit	The construction of two separate circuits on the same structures to increase capacity of the line.
Conservation Reserve Program (CRP)	The CRP provides assistance to farmers and ranchers in complying with Federal, State and Tribal environmental laws, and encourages environmental enhancement. The program is funded through the Commodity Credit Corporation (CCC). CRP is administered by the Farm Service Agency, with NRCS providing technical land eligibility determinations, conservation planning and practice implementation.
Disconnects	A power switch that can be shut off and then locked in the "off" position.
Electromagnetic Fields (EMF)	The term EMF refers to electric and magnetic fields that are coupled together, such as in high frequency radiating fields. For the lower frequencies associated with power lines, EMF should be separated into electric and magnetic fields. Electric and magnetic fields arise from the flow of electricity and the voltage of a line. The intensity of the electric field is related to the voltage of the line. The intensity of the magnetic field is related to the current flow through the conductors.
Excavation	A cavity formed by cutting, digging, or scooping.
Fauna	The collective animals of any place or time that live in mutual association.
Flora	The collective plants of any place or time that live in mutual association.
Grading	To level off to a smooth horizontal or sloping surface.
Grounding	To connect electrically with a ground.
Habitat	The place or environment where a plant or animal naturally or normally lives and grows.

High Voltage Transmission Lines (HVTL)	Overhead and underground conducting lines of either copper or aluminum used to transmit electric power over relatively long distances, usually from a central generating station to main substations. They are also used for electric power transmission from one central station to another for load sharing. High voltage transmission lines typically have a voltage of 69 kV or more.
Hydrocarbons	Compounds that contain carbon and hydrogen, found in fossil fuels.
Ionization	Removal of an electron from an atom or molecule.
Mitigate	To lessen the severity of or alleviate the effects of.
Oxide	A compound of oxygen with one other more positive element or radical.
Ozone	A form of oxygen in which the molecule is made of three atoms instead of the usual two.
Raptor	A member of the order Falconiformes, which contains the diurnal birds of prey, such as the hawks, harriers, eagles and falcons.
Sediment	Material deposited by water, wind, or glaciers.
Scientific and Natural Area	A program administered by the DNR with the goal to preserve and perpetuate the ecological diversity of Minnesota's natural heritage, including landforms, fossil remains, plant and animal communities, rare and endangered species, or other biotic features and geological formations, for scientific study and public edification as components of a healthy environment.
Stray Voltage	"Stray voltage" is a condition that can occur on the electric service entrances to structures from distribution lines, not transmission lines. More precisely, stray voltage is a voltage that exists between the neutral wire of the service entrance and grounded objects in buildings such as barns and milking parlors. Transmission lines do not, by themselves, create stray voltage because they do not connect to businesses or residences. Transmission lines, however, can induce stray voltage on a distribution circuit that is parallel to and immediately under the transmission line.

Substation	A substation is a high voltage electric system facility. It is used to switch generators, equipment, and circuits or lines in and out of a system. It also is used to change AC voltages from one level to another. Some substations are small with little more than a transformer and associated switches. Others are very large with several transformers and dozens of switches and other equipment.
Ultraviolet Radiation	A portion of the electromagnetic spectrum with wavelengths shorter than visible light.
Voltage	Electric potential or potential difference expressed in volts.
Waterfowl Production Area (WPA)	Waterfowl Production Areas preserve wetlands and grasslands critical to waterfowl and other wildlife. These public lands, managed by the U.S. Fish and Wildlife Service, were included in the National Wildlife Refuge System in 1966 through the National Wildlife Refuge Administration Act.
Wetland	Wetlands are areas that are periodically or permanently inundated by surface or ground water and support vegetation adapted for life in saturated soil. Wetlands include swamps, marshes, bogs and similar areas.
Wildlife Management Area(WMA)	Wildlife Management Areas are part of Minnesota's outdoor recreation system and are established to protect those lands and waters that have a high potential for wildlife production, public hunting, trapping, fishing and other compatible recreational uses.

10.0 Acronyms

Following are a list of acronyms used in this Application:

ACOE	Army Corps of Engineers
ACSS	Aluminum Core Steel Supported
APP	Avian Protection Plans
Application	Route Permit Application
BMPs	Best Management Practices
CCVT	Coupling Capacitor Voltage Transformer
Commission	Public Utilities Commission
CRP	Conservation Reserve Program
CSAH	County State Aid Highway
dBA	A-weighted sound level in decibels
EIS	Environmental Impact Statement
ELF	Extremely Low Frequency
EMF	Electric and Magnetic Fields
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
HVTL	High Voltage Transmission Line
kV	Kilovolt
kV/m	Kilovolts Per Meter
L	Level Descriptors or Statistical Sound Levels
mA	Milliamperes
MISO	Midwest Independent Transmission System Operator
MnDNR	Minnesota Department of Natural Resources
mG	Milligauss
MnDOT	Minnesota Department of Transportation
MOU	Memorandum Of Understanding
MPCA	Minnesota Pollution Control Agency
MPUC	Minnesota Public Utilities Commission
MW	Megawatt
MVA	Mega Volt Ampere
NAC	Noise Area Classification
NEMA	National Electrical Manufacturers Association
NERC	North American Electric Reliability Corporation
NESC	National Electric Safety Code
NHIS	National Heritage Information System
NIEHS	National Institute of Environmental Health Sciences
NRCS	Natural Resources Conservation Service

NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWI	National Wetlands Inventory
OCPD	Olmsted County Planning Department
OES	Office of Energy Security
PEER	People for Environmental Enlightenment and Responsibility, Inc.
PEMA	Palustrine Emergent Temporarily Flooded Wetland
PEMB	Palustrine Emergent Saturated Wetland
PPM	Parts Per Million
PPSA	Power Plant Siting Act
Project	Includes the 161 kV Transmission Line and Substations
PSC	Public Service Commission of Wisconsin
PSSB	Palustrine Shrub-Scrub Saturated Wetland
PWI	MnDNR Public Water Inventory
SHPO	Minnesota State Historic Preservation Office
SPC	Species in the NHIS Database That Are of Special Concern
SPS	Species Protection Scheme
TRS	Township, Section, Range
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
WHO	World Health Organization
Working Group	Interagency Working Group